

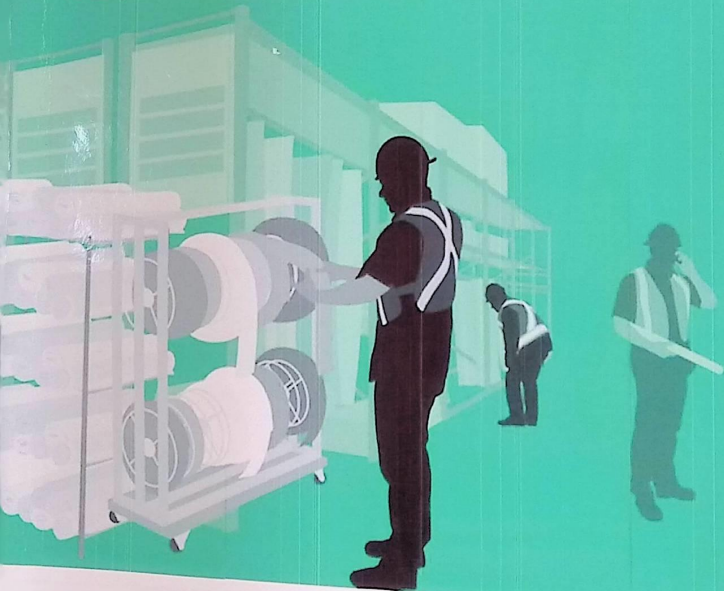
Sixth Edition



Introduction to **HEALTH AND SAFETY AT WORK**

**Phil Hughes MBE
and Ed Ferrett**

for the **NEBOSH** National General Certificate in
Occupational Health and Safety



ROUTLEDGE

Sixth Edition

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Introduction to Health and Safety at Work

For the NEBOSH
National General Certificate in Occupational Health
and Safety

Phil Hughes MBE, MSc, CFIOSH

Chairman NEBOSH 1995–2001. President of IOSH 1990–1991

**Ed Ferrett PhD, BSc (Hons Eng), CEng, MIMechE,
MIET, CMIOSH**


Vice Chairman NEBOSH 1999–2008



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This chapter covers the following NEBOSH learning objectives:

1. Describe the principles of fire initiation, classification and spread
2. Outline the principles of fire risk assessment
3. Describe the basic principles of fire prevention and the prevention of fire spread in buildings
4. Identify the appropriate fire alarm systems and fire-fighting equipment for a simple workplace
5. Outline the factors which should be considered when implementing a successful evacuation of a workplace in the event of a fire
6. In addition to the NEBOSH learning outcomes have a basic understanding of legal requirements for fire prevention

12.1 Fire initiation, classification, spread and legal requirements

12.1.1 Introduction

This chapter covers fire prevention in the workplace, and how to ensure that people are properly protected if fire does occur. Each year, UK fire and rescue services attend over 35,000 fires at work in which about 30 people are killed and over 2,500 are injured. Fire and explosions at work account for about 2% of the major injuries reported under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR 2013) (Figure 12.1).



(a)



(b)

Figure 12.1 Fire is still a significant risk in many workplaces: (a) massive Deepwater Horizon oil platform; (b) large retail premises destroyed by fire

The financial costs associated with serious fires are very high including, in many cases (believed to be over 40%), the failure to start up the business again. Never underestimate the potential of any fire. What may appear to be a small fire in a waste bin, if not dealt with can quickly spread through a building or a structure. The Bradford City Football ground in 1985, or King's Cross Underground station in 1987 are examples of where small fires quickly became raging infernos, resulting in many deaths and serious injuries. The Buncefield fuel storage depot fire in December 2005 and the Deepwater Horizon oil drilling platform fire in 2010 are further recent examples of the destruction that a large fire and explosion can cause.

Since the introduction of the Fire Services Act 1947, the fire authorities have had the responsibility for fighting fires in all types of premises. In 1971, the Fire Precautions Act gave the fire authorities control over certain fire procedures, means of escape and basic fire protection equipment through the drawing up and issuing of Fire Certificates in certain categories of building. The Fire Certification was mainly introduced to combat a number of serious industrial fires that had occurred, with a needless loss of life, where simple well-planned protection would have allowed people to escape unhurt.

Following a government review in the 1990s, the Fire Precautions (Workplace) Regulations 1999 came into force in December of that year. These Regulations were made under the Health and Safety at Work (HSW) Act. They were amended in 1999 so as to apply to a wider range of premises including those already subject to the Fire Precautions Act 1971. In many ways these Regulations established the principles of fire risk assessment which would underpin a reformed legislative framework for fire safety. There remained a difference of opinion within government as to the right home for fire legislation. The Home Office believed that process fire issues should remain with the HSW Act, while general fire safety should have a different legislative vehicle.

In 2000 the Fire Safety Advisory Board was established to reform the fire legislation to simplify, rationalise and consolidate existing legislation. It would provide for a risk-based approach to fire safety allowing more efficient, effective enforcement by the fire and rescue service and other enforcing authorities.

The Regulatory Reform (Fire Safety) Order 2005 (RRFSO) SI No 2005 1541 was made on 7 June 2005 and came into force on 1 October 2006. A summary of the Order is included in Chapter 15.

The Fire Precautions Act 1971 was repealed and the Fire Precautions (Workplace) Regulations 1997 were revoked by the Order. Since the CDM 2007 Regulations were introduced the RRFSO has been amended, as the fire sections within the Construction (Health, Safety and Welfare) Regulations 1997 (now revoked) were transferred to the CDM 2007. This was retained in CDM 2015 which came into force in April 2015.

The RRFSO reforms the law relating to fire safety in non-domestic premises. The main emphasis of the changes is to move towards fire prevention. Fire Certificates under the Fire Precautions Act 1971 were abolished by the Order and cease to have legal status. The RRFSO replaces fire certification with a general duty to ensure, so far as is reasonably practicable, the safety of employees.

There is a duty to carry out fire risk assessments that should consider the safety of both employees and non-employees.

The Order imposes a number of specific duties in relation to fire precautions to be taken. The Order provides for the enforcement of the Order, appeals, offences and connected matters. The Order also gives effect in England and Wales to parts of a number of EC Directives including the Framework, Workplace, Chemical Agents and Explosive Atmospheres Directives.

12.1.2 The Regulatory Reform (Fire Safety) Order (RRFSO) – requirements

Outline of RRFSO

Part 1 General – The RRFSO applies to all non-domestic premises other than those listed in Article 6. The main duty-holder is the ‘responsible person’ in relation to the premises, defined in Article 3. The duties on the responsible person are extended to any person who has, to any extent, control of the premises to the extent of their control (Article 5).

Part 2 imposes duties on the responsible person in relation to fire safety in premises.

Part 3 provides for enforcement.

Part 4 provides for offences and appeals.

Part 5 provides for miscellaneous matters including fire-fighters’ switches for luminous tube signs, maintenance measures provided to ensure the safety of fire-fighters, civil liability for breach of statutory duty by an employer, special requirements for licensed premises and consultation by other authorities.

Schedule 1 sets out the matters to be taken into account in carrying out a risk assessment (Parts 1 and 2), the general principles to be applied in implementing fire safety measures (Part 3) and the special measures to be taken in relation to dangerous substances (Part 4).

The Order is mainly enforced by the fire and rescue authorities.

PART 1 General

Meanings

The Order defines a responsible person as the person who is in control of the premises – this may be the owner or somebody else.

The meaning of general fire precautions is set out in the Order, which covers:

- ▶ reduction of fire risks and fire spread;
- ▶ means of escape;
- ▶ keeping means of escape available for use;
- ▶ fire-fighting;
- ▶ fire detection and fire warning;
- ▶ action to be taken in the event of fire;
- ▶ instruction and training of employees.

But they do not cover **process-related fire precautions**. These include the use of plant or machinery or the use or storage of any dangerous substances. Process-related fire precautions still come under either the Health and Safety Executive (HSE) or Local Authority, and are covered by the general duties imposed by the HSW Act 1974 or other specific Regulations like the Dangerous Substances and Explosive Atmosphere Regulations (DSEAR).

Duties

Duties are placed on a ‘responsible person’ who is:

- ▶ the employer in a workplace, to the extent they have control;
- ▶ any other person who has control of the premises; or
- ▶ the owner of the premises.

The obligations of a particular responsible person relate to matters within their control. It is therefore advisable that arrangements between responsible persons, where there may be more than one (such as contracts or tenancy agreements) should clarify the division of responsibilities.

Premises covered

The RRFSO does not cover domestic premises, offshore installations, a ship (normal shipboard activities under a master), remote fields, woods or other land forming part of an agricultural or forestry operation (it does cover the buildings), means of transport, a mine (it does cover the buildings at the surface) and a borehole site.

Other alternative provisions cover premises such as sports grounds.

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PART 2 Fire Safety Duties

The responsible person must take appropriate general fire precautions to protect both employees and persons who are not employees to ensure that the premises are safe. Details are given in Chapter 15.

Risk assessment and arrangements

The responsible person must:

- ▶ make a 'suitable and sufficient' risk assessment to identify the general fire precautions required (usually known as a fire risk assessment); if a dangerous substance is or is liable to be present, this assessment must include the special provisions of Part 1 of Schedule 1 to the Order;
- ▶ review the risk assessment regularly or when there have been significant changes; with regard to young persons, take into account Part 2 of Schedule 1;
- ▶ record the significant findings where five or more people are employed or where there is a licence or Alterations Notice in place for the premises;
- ▶ apply the principles of prevention Part 3 of Schedule 1,
- ▶ set out appropriate fire safety arrangements for planning, organisation, control, monitoring and review;
- ▶ eliminate or reduce risks from dangerous substances in accordance with Part 4 of Schedule 1.

Fire-fighting and fire detection

The responsible person must ensure that the premises are provided with appropriate:

- ▶ fire-fighting equipment (FFE);
- ▶ fire detectors and alarms;
- ▶ measures for fire-fighting which are adapted to the size and type of undertaking;
- ▶ trained and equipped competent persons to implement fire-fighting measures;
- ▶ contacts with external emergency services, particularly as regards fire-fighting, rescue work, first-aid and emergency medical care.

Emergency routes, exits and emergency procedures

The responsible person must ensure that routes to emergency exits and the exits themselves are kept clear and ready for use. See Chapter 15 for specific requirements for means of escape.

The responsible person must establish suitable and appropriate emergency procedures and appoint a sufficient number of competent persons to implement the procedures. This includes arrangements for undertaking fire drills and the provision of information and action regarding exposure to serious, imminent and unavoidable dangers. Where dangerous substances are used and/or stored, additional emergency measures covering the hazards must be set up. There should be appropriate visual or audible warnings and other communications systems to effect a prompt and safe exit from the endangered area.

Where necessary to protect persons' safety, all premises and facilities must be properly maintained and subject to a suitable system of maintenance.

Safety assistance

The responsible person must appoint (except in the case of the self-employed or partnerships where a person has the competence themselves) one or more people to assist in undertaking the preventative and protective measures. Competent persons must be given the time and means to fulfil their responsibilities. Competent persons must be kept informed of anything relevant to their role and have access to information on any dangerous substances present on the premises.

Provision of information

The responsible person must provide their own employees, and the employer of any employees of an outside undertaking, with comprehensible and relevant information on the risks, precautions taken, persons appointed for fire-fighting and fire drills, and appointment of competent persons. Additional information is also required for dangerous substances used and/or stored on the premises.

Before a child (16–18 years old) is employed, information on special risks to children must be given to the child's parent or guardian.

Capabilities, training and cooperation

The responsible person must ensure that adequate training is provided when people are first employed or exposed to new or increased risks. This may occur with new equipment, changes of responsibilities, new technologies, new systems of work and new substances used. The training has to be done in working hours and repeated periodically as appropriate.

Where two or more responsible persons share duties or premises, they are required to coordinate their activity and cooperate with each other, including keeping each other informed of risks.

Duties of employees

These are covered in Chapter 15 and are similar to requirements under the HSW Act. Employees must take care of themselves and other relevant persons. They must cooperate with the employer and inform them of any situation which they would reasonably consider to present a serious and immediate danger, or a shortcoming in the protection arrangements.

PART 3 Enforcement

Enforcing authorities

The fire and rescue authority in the area local to the premises is normally the enforcing authority. However, in stand-alone construction sites, premises which require a Nuclear licence, and where a ship is under repair, the HSE is the enforcing authority, except for

the general means of escape and fire emergency procedures under CDM 2015.

Fire and rescue authorities officers appointed under the RRFSO have similar powers to those under the HSW Act. These include the power to enter premises, make enquiries, require information, require facilities and assistance, take samples, require an article or substance to be dismantled or subjected to a process or test and the power to issue Enforcement Notices.

In addition to fire safety legislation, health and safety at work legislation also covers the elimination or minimisation of fire risks. As well as the particular and main general duties under the HSW Act, fire risks are covered by specific rules, such as for dangerous substances and explosive atmospheres, work equipment, electricity and other hazards. Thus, environmental health officers or HSE inspectors may enforce health and safety standards for the assessment and removal or control of process-related fire risks, where it is necessary, for the protection of workers and others.

Alterations and Enforcement Notices

Enforcing authorities can issue (see Chapter 15 for details):

Alterations Notices – where the premises constitute a serious risk to people either due to the features of the premises, or hazards present on the premises. The Notices require the responsible person to notify changes and may require them to record the significant findings of the risk assessment and safety arrangements and to supply a copy of the risk assessment before making changes.

Enforcement Notices – where there is a failure to comply with the requirements of the RRFSO. The Notice must specify the provisions concerned and MAY include directions on remedial action.

Prohibition Notices – where the risks are so serious that the use of the premises should be prohibited or restricted. The Notice MAY include directions on remedial action.

PART 4 Offences

Cases can be tried on summary conviction in a Magistrate's Court or on indictment in the Crown Court. The responsible person can be liable:

- ▶ on summary conviction to a fine not exceeding the statutory maximum;
- ▶ on indictment to an unlimited fine and/or imprisonment for up to 2 years for failure to comply with fire safety duties where there is a risk of death or serious injury and for failure to comply with an Alterations, Enforcement or Prohibition Notice.

Any person who fails to comply with their duties under the Order as regards fire risks can be prosecuted alongside or instead of a responsible person. Fines

are limited to the statutory maximum (or levels 3 or 5 on the standard scale) on summary conviction but on indictment, the fine is unlimited.

Employees' Capabilities

The Fire Safety (Employees' Capabilities) (England) Regulations 2010 were introduced on 6 April 2010 to ensure that employers must take into account employees' capabilities as regards fire safety in entrusting tasks to them.

The making of these regulations was a technical exercise to ensure that the EU legislation was transposed into English fire safety law. Not to do so may have resulted in EU infraction proceedings. Employers already had to comply with the regulation under wider health and safety legislation and the requirements of the 2010 regulations were already implicit in the RRFSO.

12.1.3 Construction Design and Management Regulations 2015

Details of CDM 2015 are given in Chapter 15. Regulation 36 makes the Fire and Rescue authority responsible for the non-process fire-related sections of CDM 2015 on construction sites where other people are working within or as part of the site – for example, the work is being done in an occupied factory or office building. The Regulations concerned are as follows.

Regulation 30: Emergency procedures

In so far as they concern fire emergency procedures and involve suitable procedures for evacuation, familiarisation of workers and testing the arrangements.

Regulation 31: Emergency routes and exits

In so far as they concern fire emergency routes and exits and involve the following:

- ▶ a sufficient number of emergency routes and exits;
- ▶ must lead directly as possible to an identified safe place,
- ▶ must be kept clear and free of obstruction;
- ▶ provided with emergency lights as necessary;
- ▶ suitably signed.

Regulation 32: Fire detection and fire-fighting

This involves the following:

- ▶ suitably located fire-fighting equipment (FFE);
- ▶ suitably located fire detection and alarm systems;
- ▶ proper maintenance, examination and testing;
- ▶ ease of access unless automatically activated;
- ▶ training for every person on the construction site in the operation of fire equipment that they are likely to use;

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Table 12.1 Enforcement in respect of fire on construction sites

Type of premises fire issue		Fire and Rescue Authorities Under RRFSO and CDM 2015	HSE under HSW Act, CDM 2015 and RRFSO	Local Authorities, Inspectors under HSW Act, and RRFSO	Defence fire service	A fire inspector or person appointed by the Secretary of State
Fire emergency procedures; escape routes and exits; fire detection and fire-fighting; and training issues on:	Stand-alone construction site		✓			
	Construction site where there are other activities (e.g. an occupied factory or office)	✓				
Process fire and explosion risks, where there are, for example, tar boilers/dangerous substances on:	Stand-alone sites		✓	✓		
	Sites where there are other activities (e.g. an occupied factory or office)					
Licensed nuclear sites and ships under construction or repair			✓			
Defence and Crown armed forces premises other than a ship					✓	✓
Sports grounds and sports stands				✓		
Crown premises except nuclear; UK Atomic Energy premises except nuclear						✓

- ▶ where there is a particular risk of fire, people being instructed before starting the work;
- ▶ equipment suitably signed.

See Table 12.1 for the various enforcement authorities and their responsibilities on construction sites.

12.1.4 Basic principles of fire

Fire triangle

Fire cannot take place unless three things are present. These are shown in Figure 12.2.

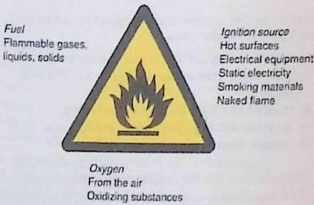


Figure 12.2 Fire triangle

The absence of any one of these elements will prevent a fire from starting. Prevention depends on avoiding these three coming together. Fire extinguishing depends on removing one of the elements from an existing fire, and is particularly difficult if an oxidising substance is present.

Once a fire starts, it can spread very quickly from fuel to fuel as the heat increases.

Sources of ignition

Workplaces have numerous sources of ignition, some of which are obvious but others may be hidden inside machinery. Most of the sources may cause an accidental fire from sources inside but, in the case of arson (about 13% of industrial fires), the source of ignition may be brought from outside the workplace and will be deliberately used. The following are potential sources of ignition in the typical workplace:

Naked flames – from smoking materials, cooking appliances, heating appliances and process equipment.

External sparks – from grinding metals, welding, impact tools, electrical switch gear.

Internal sparking – from electrical equipment (faulty and normal), machinery, lighting.

Hot surfaces – from lighting, cooking, heating appliances, process equipment, poorly ventilated equipment, faulty and/or badly lubricated equipment, hot bearings and drive belts.

Static electricity – causing significant high-voltage sparks from the separation of materials such as unwinding plastic, pouring highly flammable liquids, walking across insulated floors or removing synthetic overalls.

Sources of fuel

If it will burn it can be fuel for a fire. The things which will burn easily are the most likely to be the initial fuel, which then burns quickly and spreads the fire to other fuels. The most common things that will burn in a typical workplace are:

Solids – these include: wood, paper, cardboard, wrapping materials, plastics, rubber, foam (e.g. polystyrene tiles and furniture upholstery), textiles (e.g. furnishings and clothing), wallpaper, hardboard and chipboard used as building materials, waste materials (e.g. wood shavings, dust, paper), hair (see Figure 12.3(a) and (b)).



Danger
Flammable solid

Figure 12.3 (a) Transport flammable solid sign, (b) GHS – packaging sign

Liquids – these include: paint, varnish, thinners, adhesives, petrol, white spirit, methylated spirits, paraffin, toluene, acetone and other chemicals. Most flammable liquids give off vapours which are heavier than air so they will fall to the lowest levels. A flash flame or an explosion can occur if the vapour catches fire in the correct concentrations of vapour and air (see Figures 12.4(a) and (b)).

Gases – flammable gases include LPG (liquefied petroleum gas in cylinders, usually butane or propane), acetylene (used for welding) and hydrogen. An explosion can occur if the air/gas mixture is within the explosive range (see Figures 12.5(a) and (b)).



Danger
Highly Flammable Liquid

Figure 12.4 (a) Transport flammable liquid sign, (b) GHS – packaging sign



Danger
Extremely Flammable Gas

Figure 12.5 (a) Transport flammable gas sign, (b) GHS – packaging sign

Oxygen

Oxygen is of course provided by the air all around but this can be enhanced by wind, or by natural or powered ventilation systems which will provide additional oxygen to continue burning. Cylinders providing oxygen for medical purposes or welding can also provide an additional very rich source of oxygen.

In addition, some chemicals such as nitrates, chlorates, chromates and peroxides can release oxygen as they burn and therefore need no external source of air (see Figures 12.6(a) and (b)).



Danger
May cause or intensify fire
Oxidizer

Figure 12.6 (a) Transport oxidising agent sign,
(b) GHS – packaging sign

12.1.5 Classification of fire

Fires are classified in accordance with British Standard EN 2:1992 Classification of Fires. For all practical purposes there are FIVE main classes of fire – A, B, C, D and F, plus fires involving electrical equipment. BS 7937:2000 The Specification of Portable Fire Extinguishers for Use on Cooking Oil Fires introduced the new class F. The categories based on fuel and the means of extinguishing are as follows:

Class A – Fires which involve solid materials such as wood, paper, cardboard, textiles, furniture and plastics where there are normally glowing embers during combustion. Such fires are extinguished by cooling, which is achieved using water.

Class B – Fires which involve liquids or liquefied gases such as paints, oils or fats. These can be further subdivided into:

Class B1 – Fires which involve liquids that are soluble in water such as methanol. They can be extinguished by carbon dioxide, dry powder, water spray, foam and vaporising liquid;

Class B2 – Fires which involve liquids not soluble in water, such as petrol and oil. They can be extinguished by using foam, carbon dioxide, dry powder, light water and vaporising liquid.

Class C – Fires which involve gases such as natural gas, or liquefied gases such as butane or propane. They can be extinguished using foam or dry powder in conjunction with water to cool any containers involved or nearby.

Class D – Fires which involve metals such as aluminium or magnesium. Special dry powder extinguishers are required to extinguish these fires, which may contain powdered graphite or talc.

Class F – Fires which involve high-temperature cooking oils or fats in large catering establishments or restaurants.

Electrical fires – Fires involving electrical equipment where the circuitry do not constitute a fire class on their own as electricity is a source of ignition that will feed a fire until switched off or isolated. But there are some pieces of equipment that can store, within capacitors, lethal voltages even when isolated. Extinguishers specifically designed for electrical use like carbon dioxide or dry powder units should always be used for this type of fire hazard.

Fire extinguishers are usually designed to tackle one or more classes of fire. This is discussed in 12.4.

12.1.6 Principles of heat transmission and fire spread

Fire transmits heat in several ways, which need to be understood in order to prevent, plan escape from, and fight fires. Heat can be transmitted by convection, conduction, radiation and direct burning (Figure 12.7).

Convection

Hot air becomes less dense and rises, drawing in cold new air to fuel the fire with more oxygen. The heat is transmitted upwards at sufficient intensity to ignite combustible materials in the path of the very hot products of combustion and flames. This is particularly important inside buildings or other structures where the shape may effectively form a chimney for the fire.

Conduction

This is the transmission of heat through a material with sufficient intensity to melt or destroy the material and ignite combustible materials which come into contact or close to a hot section. Metals like copper, steel

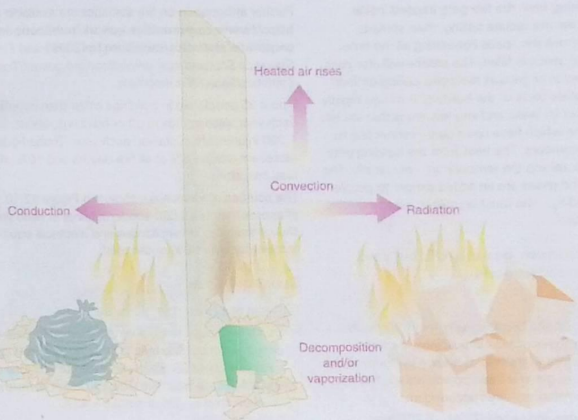


Figure 12.7 Principles of heat transmission

and aluminium are very effective or good conductors of heat. Other materials like concrete, brickwork and insulation materials are very ineffective or poor conductors of heat.

Poor conductors or good insulators are used in fire protection arrangements. When a poor conductor is also incombustible, it is ideal for fire protection. Care is necessary to ensure that there are no other issues, such as health risks, with these materials. Asbestos is a very poor conductor of heat and is incombustible. However, it can cause very severe health effects, which now outweighs its value as a fire protection material and it is banned in the United Kingdom. Although still found in many buildings where it was used extensively for fire protection, it now has to be managed under the Control of Asbestos Regulations.

Radiation

Often in a fire, the direct transmission of heat through the emission of heat waves from a surface can be so intense that adjacent materials are heated sufficiently to ignite. A metal surface glowing red-hot would be typical of a severe radiation hazard in a fire.

Direct burning

This is the effect of combustible materials catching fire through direct contact with flames which causes fire to spread, in the same way that lighting an open fire, with a range of readily combustible fuels, results in its spread within a grate.

Fire and smoke spread in buildings

Where fire is not contained and people can move away to a safe location, there is little immediate risk to those people. However, where fire is confined inside buildings the fire behaves differently (Figure 12.8).

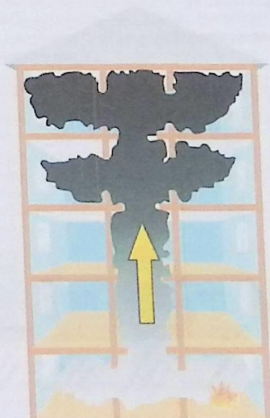


Figure 12.8 Smoke spread in buildings

The smoke rising from the fire gets trapped inside the space by the immediate ceiling, then spreads horizontally across the space deepening all the time until the entire space is filled. The smoke will also pass through any holes or gaps in the walls, ceiling or floor and get into other parts of the building. It moves rapidly up staircases or lift wells and into any areas that are left open, or rooms which have open doors connecting to the staircase corridors. The heat from the building gets trapped inside, raising the temperature very rapidly. The toxic smoke and gases are an added danger to people inside the building, who must be able to escape quickly to a safe location.

12.1.7 Common causes of fire and consequences

Causes

The Communities and Local Government fire statistics show that the causes of fires in buildings, excluding dwellings, in recent years was as shown in Figure 12.9. The total shows a general trend downwards in the last ten years. The majority of fires occurred in:

- ▶ private garages and sheds (22%) – 6,700 fires;
- ▶ retail distribution (14%) – 4,200 fires;
- ▶ restaurants, cafes, public houses, etc. (9%) – 2,600 fires;
- ▶ industrial premises (other than construction) (8%) – 2,400 fires;
- ▶ recreational and other cultural services (6%) – 1,700 fires.

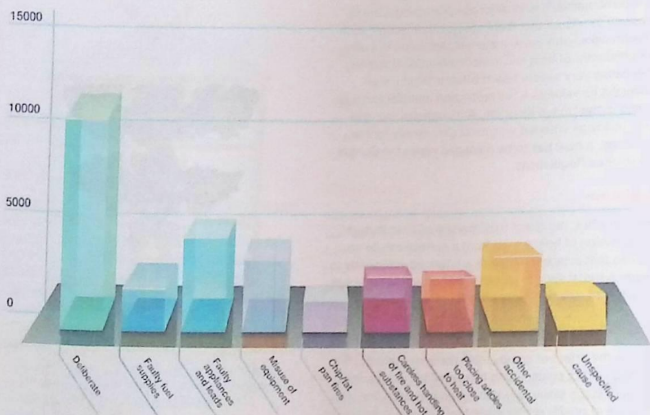


Figure 12.9 Causes of fire in recent years

Further information on fire statistics are available at: <http://www.communities.gov.uk/publications/corporate/statistics/monitorq1q420091> and *Fire Statistics Scotland* see: www.scotland.gov.uk/Topics/Statistics/Search/Forthcoming.

About 35 people die in buildings other than dwellings each year. Also in fires in other buildings, about 1,300 injuries are sustained each year. These figures represent around 8% of all fire deaths and 10% of non-fatal casualties.

The sources of ignition are shown in Figure 12.10. Out of approximately 19,000 accidental fires in each year it shows that cooking appliances and electrical equipment account for over 60% of the total.

Consequences

The main consequences of fire are:

- ▶ Death – although this is a very real risk, relatively few people die in building fires that are not in dwellings. Each year about 35 (8%) people die out of a total of about 440 in all fires. The main causes of all deaths are:
 - ▷ overcome by gas or smoke – 43%
 - ▷ burns – 26%
 - ▷ burns and overcome by gas or smoke – 20%
 - ▷ other – 2%
 - ▷ unspecified – 9%

Clearly gas and smoke are the main risks.

- ▶ Personal injury – some 1,282 people were injured (10% of total injuries in all fires):

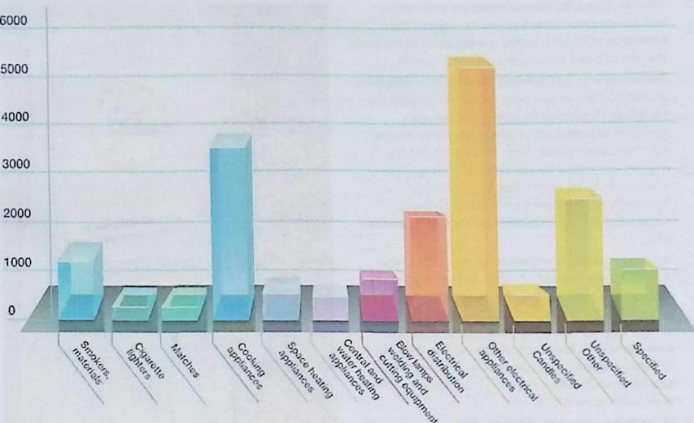


Figure 12.10 Accidental fires – sources of ignition in recent years

- ▶ Building damage – can be very significant, particularly if the building materials have poor resistance to fire and there is little or no built-in fire protection;
- ▶ Flora and fauna damage – can be significant, particularly in a hot draught or forest fire;
- ▶ Loss of business and jobs – it is estimated that about 40% of businesses do not start up again after a significant fire. Many are under- or not insured and small companies often cannot afford the time and expense of setting up again when they probably still have old debts to service;
- ▶ Transport disruption – rail routes, roads and even airports are sometimes closed because of a serious fire. The worst cases in recent years were 11 September 2001 in the USA and the Icelandic ash cloud over Europe in 2010, when airports around the world were disrupted;
- ▶ Environmental damage from the fire and/or fighting the fire – fire-fighting water, the products of combustion and exploding building materials, such as asbestos cement roofs, can contaminate significant areas around the fire site.

12.2 Fire risk assessment

12.2.1 General

Fire risk assessments come under the RRFSO and not under the Management of Health and Safety at Work Regulations 1999.

A fire risk assessment will indicate what fire precautions are needed. There are numerous ways of carrying out a fire risk assessment. The one described below is based on the method contained within Fire Safety Guides published by the Department of Communities and Local Government (see Appendix 12.1). A systematic approach, considered in five simple stages, is generally the best practical method. The RRFSO guides are downloadable on www.firesafetyguides.communities.gov.uk.

12.2.2 Stage 1 – identify fire hazards

There are five main hazards produced by fire that should be considered when assessing the level of risk:

- ▶ oxygen depletion;
- ▶ flames and heat;
- ▶ smoke;
- ▶ gaseous combustion products;
- ▶ structural failure of buildings.

Of these, smoke and other gaseous combustion products are the most common cause of death in fires.

For a fire to occur, it needs sources of heat and fuel. If these hazards can be kept apart, removed or reduced, then the risks to people and businesses are minimised.

Identifying fire hazards in the workplace is the first stage as follows:

- (a) **Identify any combustibles** – Most workplaces contain combustible materials. Usually, the presence of normal stock in trade should not cause

concern, provided the materials are used safely and stored away from sources of ignition. Good standards of housekeeping are essential to minimise the risk of a fire starting or spreading quickly.

The amount of combustible material in a workplace should be kept as low as is reasonably practicable. Materials should not be stored in gangways, corridors or stairways or where they may obstruct exit doors and routes. Fires often start and are assisted to spread by combustible waste in the workplace. Such waste should be collected frequently and removed from the workplace, particularly where processes create large quantities of it.

Some combustible materials, such as flammable liquids, gases or plastic foams, ignite more readily than others and quickly produce large quantities of heat and/or dense toxic smoke. Ideally, such materials should be stored away from the workplace or in fire-resisting stores. The quantity of these materials kept or used in the workplace should be as small as possible, normally no more than half a day's supply.

- (b) **Identify any sources of heat** – All workplaces will contain heat/ignition sources; some will be obvious such as cooking sources, heaters, boilers, engines, smoking materials or heat from processes, whether in normal use or through carelessness or accidental failure. Others may be less obvious such as heat from chemical processes or electrical circuits and equipment.

Where possible, sources of ignition should be removed from the workplace or replaced with safer forms. Where this cannot be done, the ignition source should be kept well away from combustible materials or made the subject of management controls.

Particular care should be taken in areas where portable heaters are used or where smoking is permitted (now banned inside premises). Where heat is used as part of a process, it should be used carefully to reduce the chance of a fire as much as possible. Good security both inside and outside the workplace will help to combat the risk of arson.

Under smoke-free legislation, smoking is not permitted in enclosed or significantly enclosed areas. Outside designated safe areas should be provided for those who still wish to smoke. The smoking rules should be rigorously enforced (Figure 12.11).

Demolition work can involve a high risk of fire and explosion. In particular:

- ▶ Dismantling tank structures can cause the ignition of flammable residues. This is especially dangerous if hot methods are used to dismantle tanks before residues are thoroughly cleaned out. The work should only be done by specialists.



Figure 12.11 Smoke-free sign

- ▶ Disruption and ignition of buried gas and electrical services is a common problem. It should always be assumed that buried services are present unless it is positively confirmed that the area is clear. A survey using service detection equipment must be carried out by a competent person to identify any services. The services should then be marked, competently purged or made dead, before any further work is done. A permit to excavate or dig is the normal formal procedure to cover buried services.

- (c) **Identify any unsafe acts** – Persons undertaking unsafe acts such as smoking next to combustible materials, etc.
- (d) **Identify any unsafe conditions** – These are hazards that may assist a fire to spread in the workplace, for example if there are large areas of hardboard or polystyrene tiles, etc., or open stairs that can enable a fire to spread quickly, trapping people and engulfing the whole building.

An ideal method of identifying and recording these hazards is by means of a simple single-line plan, an example of which is illustrated in Figure 12.12. Checklists may also be used (see Appendix 12.1).

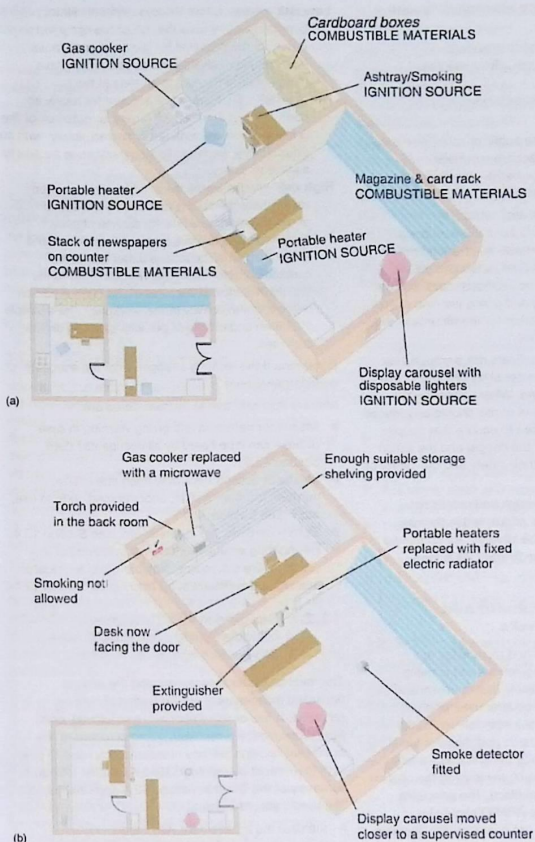


Figure 12.12 (a) Before fire risk assessment, (b) after fire risk assessment

12.2.3 Stage 2 – identify persons who are at significant risk

Consider the risk to any people who may be present. In many instances and particularly for most small workplaces the risk(s) identified will not be significant,

and specific measures for persons in this category will not be required. There will, however, be some occasions when certain people may be especially at risk from the fire, because of their specific role, disability, sleeping, location or the workplace activity

(see Section 12.5.3 for more information). Special consideration is needed if:

- ▶ sleeping accommodation is provided;
- ▶ persons are physically, visually or mentally challenged;
- ▶ people are unable to react quickly;
- ▶ persons are isolated.

People, such as visitors, the public or other workers, may come into the workplace from outside.

The assessor must decide whether the current arrangements are satisfactory or if changes are needed.

Because fire is a dynamic event, which, if unchecked, will spread throughout the workplace, all people present will eventually be at risk if fire occurs. Where people are at risk, adequate means of escape from fire should be provided together with arrangements for detecting and giving warning of fire. Fire-fighting equipment suitable for the hazards in the workplace should be provided.

Some people may be at significant risk because they work in areas where fire is more likely or where rapid fire growth can be anticipated. Where possible, the hazards creating the high level of risk should be reduced. Specific steps should be taken to ensure that people affected are made aware of the danger and the action they should take to ensure their safety and the safety of others.

Young persons may not be employed unless risks to young persons have been addressed in the risk assessment. The issues to be covered are contained in Part 2 of Schedule 1 of the RRFSO 2005 (see Chapter 15).

12.2.4 Stage 3 – evaluate and reduce the risks

If the building has been built and maintained in accordance with Building Regulations and is being put to its designed use, it is likely that the means of escape provisions will either be adequate, or it will be easy to decide what is required in relation to the risk. Having identified the hazards and the persons at risk, the next stage is to reduce the chance of a fire occurring and spreading, thereby minimising the chance of harm to persons in the workplace. The principles of prevention laid down in the RRFSO should be followed at this stage. These are based on EC Directive requirements and are therefore the same as those used in the Management Regulations Regulation 4 (see Chapter 15).

Evaluate the risks

Attempt to classify each area as 'high', 'normal' or 'low risk'. If 'high risk', it may be necessary to reconsider the principles of prevention, otherwise additional compensatory measures will be required.

Low risk – Areas where there is minimal risk to persons' lives; where the risk of fire occurring is low; or the potential for fire, heat and smoke spreading is negligible and people would have plenty of time to react to an alert of fire.

Normal risk – Such areas will account for nearly all parts of most workplaces; where an outbreak is likely to remain confined or spread slowly, with effective fire warning allowing persons to escape to a place of safety.

High risk – Areas where the available time needed to evacuate the area is reduced by the speed of development of a fire, for example highly flammable or explosive materials stored or used (other than small quantities under controlled conditions); also where the reaction time to the fire alarm is slower because of the type of person present or the activity in the workplace, for example the infirm and elderly or persons sleeping on the premises.

Determine if the existing arrangements are adequate, need improvement.

Matters that will have to be considered are:

- ▶ Means for detecting and giving warning in case of fire – can it be heard by all occupants? (See Section 12.4.)
- ▶ Means of escape – are they adequate in size, number, location, well lit, unobstructed, safe to use etc.? (See Section 12.4.)
- ▶ Signs – for exits, fire routines, etc. (see Section 12.4.)
- ▶ Fire-fighting arrangements – wall-mounted or in a cradle on fire exit routes, suitable types for hazards present and sufficient in number? (See Section 12.4.)

12.2.5 Stage 4 – the findings (always recommended, see Stage 5 – review)

The findings of the assessment and the actions (including maintenance) arising from it should be recorded. If five or more people are employed, or an Alterations Notice is required, a formal record of the significant findings and any measures proposed to deal with them must be recorded. (See Appendix 12.2 and summary of the Order in Section 12.1 and Chapter 15.) The record should indicate:

- ▶ the date the assessment was made;
- ▶ the hazards identified;
- ▶ any staff and other people especially at risk;
- ▶ what action needs to be taken, and by when (**action plan**);
- ▶ the conclusions arising.

The above guidelines are to be used with caution. Each part of the workplace must be looked at and a decision made on how quickly persons would react to an alert of fire in each area. Adequate safety measures will be required if persons are identified as being at risk. Where

maximum travel distances (see 12.5 and Table 12.3) cannot be achieved, extra fire safety precautions will be needed.

Where persons are at risk or an unacceptable hazard still exists, additional fire safety precautions will be required to compensate for this, or alternatively repeat previous stages to manage risk to an acceptable level.

12.2.6 Stage 5 – monitor and review on a regular basis

The fire risk assessment is not a one-off procedure. It should be continually monitored to ensure that the existing fire safety arrangements and fire risk assessment remain realistic. The assessment should be reviewed if there is a significant change in the occupancy, work activity, the materials used or stored when building works are proposed, or when it is no longer thought to be valid.

12.2.7 Structural features

The workplace may contain features that could promote the rapid spread of fire, heat or smoke and affect escape routes. These features may include ducts or flues, openings in floors or walls, or combustible wall or ceiling linings. Where people are put at risk from these features, appropriate steps should be taken to reduce the potential for rapid fire spread by, for example, non-combustible automatic dampers fitted in ducts or to provide an early warning of fire so that people can leave the workplace before their escape routes become unusable.

Combustible wall or ceiling linings should not be used on escape routes and large areas should be removed wherever they are found. Other holes in fire-resisting floors, walls or ceilings should be filled in with fire-resisting material to prevent the passage of smoke, heat and flames.

12.2.8 Temporary workplaces, maintenance and refurbishment

Temporary workplaces such as construction sites, temporary buildings, festivals and fêtes all have requirements for fire precautions and means of escape in case of fire. The scale of the temporary workplace will dictate the requirements which will depend on:

- ▶ the number of persons working or visiting the site at any one time;
- ▶ the nature of the materials being used to construct the workplace or being used in the workplace. Are they flammable or highly flammable?
- ▶ height above or below the ground floor and how far it is to a place of safety;
- ▶ the location whether in a remote area or close to water supplies and/or fire and rescue services;

- ▶ the size of the premises and whether audible warnings can be heard.

Risk assessments will be needed to determine the level of precautions necessary. Guidance has been given in Fire Safety in Construction 2nd Edition HSG 168 HSE Books downloadable at <http://www.hse.gov.uk/pubns/books/hsg168.htm>

Sources of heat or combustible materials may be introduced into the workplace during periods of maintenance or refurbishment. Where the work involves the introduction of heat, such as welding, this should be carefully controlled by a safe system of work, for example Hot Work Permit (see Chapter 4 for details). All materials brought into the workplace in connection with the work being carried out should be stored away from sources of heat and not obstruct exit routes.

12.2.9 Fire plans

Fire plans should be produced and attached to the fire risk assessment. A copy should be posted in the workplace. A single-line plan of the area or floor should be produced or an existing plan should be used which needs to show:

- ▶ escape routes, numbers of exits, number of stairs, fire-resisting doors, fire-resisting walls and partitions, places of safety, and the like;
- ▶ fire safety signs and notices including pictorial fire exit signs and fire action notices;
- ▶ the location of fire warning call points and sounders or rotary gongs;
- ▶ the location of emergency lights;
- ▶ the location and type of fire-fighting equipment.

See Figure 12.27 for an evacuation plan.

12.3 Fire prevention and prevention of fire spread

This section provides further information on evaluating the risk of a fire and its prevention in premises. The following should be considered:

- ▶ good housekeeping;
- ▶ control of flammable and combustible materials;
- ▶ control of ignition sources;
- ▶ systems of work.

12.3.1 Control measures

Housekeeping

Good housekeeping will lower the chances of a fire starting, so the accumulation of combustible materials in all premises should be monitored carefully. Good housekeeping is essential to reduce the chances of escape routes and fire doors being blocked or obstructed.

Waste material should be kept in suitable containers before it is removed from the premises. If bins,

particularly wheeled bins, are used outside, secure them in a compound to prevent them being moved to a position next to the building and set on fire. Never place skips against a building – they should normally be a minimum of 6 m away from any part of the premises.

If considerable quantities of combustible waste material are generated then a formal plan to manage this effectively needs to be developed.

In higher risk areas special arrangements should be in place for close down, e.g. checking all appliances are turned off and combustible waste has been removed.

Storage

Many of the materials found in premises will be combustible which will increase the fire risk. Combustible materials are not just those generally regarded as highly combustible, such as polystyrene, but all materials that will readily catch fire. Even non-combustible materials may present a fire hazard when packed in combustible materials.

The absence of adequate storage arrangements results in congestion on the factory floor, warehouse or shop. In offices, the retention of large quantities of paper records, especially if not filed away in proprietary cabinets, can increase the fire hazard. Such readily available flammable material makes the potential effect of arson more serious. Many shops or hotels will take great care to present an efficient and attractive image in the retail or public areas, while other areas are neglected and allowed to become over-stocked or dumping areas for unsold material, old furniture and the like (see Figure 12.13).

This may lead to a concealed fire, and restriction of access to the fire, fire extinguishers, alarm points and escape routes. Discarded packaging materials, e.g. polystyrene and cardboard, and even piles of wooden pallets can introduce severe fire hazards. Poorly

managed storage areas often become over-stocked or dumping areas for unwanted material. Do not place combustible material against electrical equipment, heaters, even if turned off for the summer.

To reduce the risk, store excess materials and stock in a dedicated storage area, storeroom or cupboard. Do not store excess stock in areas where the public will normally have access.

Consider how stock is displayed in shops and evaluate any additional risk of fire that it generates. For example, rugs stacked on the floor on top of each other would not present a high fire risk, but rolls of carpet stored vertically up against a wall or hung on displays present a vertical surface for fire to spread rapidly upwards. The display of large quantities of clothing on vertical hangers is also likely to increase the risk of rapid fire development.

The fire risk assessment should also consider any additional risk generated by seasonal products such as fireworks and Christmas decorations.

Consider the following to reduce these risks:

- ▶ ensure storage and display areas are adequately controlled and monitored;
- ▶ use fire-resistant display materials wherever possible (suppliers should be able to provide evidence of this); and
- ▶ ensure electrical lighting used as part of the display does not become a potential source of ignition.

Voids (including roof voids) should not be used for the storage of combustible material. Such voids should be sealed off or kept entirely open to allow for easy access for inspection and the removal of combustible materials.

Equipment and machinery

Common causes of fire in equipment are:

- ▶ allowing ventilation points to become clogged or blocked, causing overheating;
- ▶ inadequate cleaning of heat-shrink packaging equipment, such as that used in in-store bakeries;
- ▶ allowing extraction equipment in catering environments to build up excessive grease deposits;
- ▶ misuse or lack of maintenance of cooking equipment and appliances; and
- ▶ disabling or interfering with automatic or manual safety features and cut-outs.

All machinery, apparatus and office equipment should be properly maintained by a competent person. Appropriate signs and instructions on safe use may be necessary.

Fork-lift trucks and other vehicles

There are hazards associated with industrial vehicles, particularly during refuelling and maintenance operations; also when stored or in use. Battery charging of fork-lift trucks can give rise to sparks and hydrogen (a gas that is highly flammable, explosive and is lighter

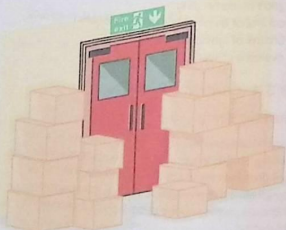


Figure 12.13 Partly blocked fire exit door

than air). Sparks can occur when connecting and disconnecting power supplies.

Fork-lift truck charging points should be carefully sited in a well-ventilated area (ideally direct to open air), clear of ignition sources and preferably in a separate dedicated non-combustible structure. However, if sited in the building, the charging point should be against a fire-resisting wall (e.g. 30-minute fire resistance).

Heating

Individual heating appliances require particular care if they are to be used safely, particularly those which are kept for emergency use during a power cut or as supplementary heating during severe weather. The greatest risks arise from lack of maintenance and staff unfamiliarity with them. Heaters should preferably be secured in position when in use and fitted with a fire guard if appropriate.

As a general rule, convector or fan heaters should be preferred to radiant heaters because they present a lower risk of fire and injury.

The following rules should be observed:

- ▶ all heaters should be kept well clear of combustible materials and where they do not cause an obstruction;
- ▶ heaters which burn a fuel should be sited away from draughts;
- ▶ portable fuel burning heaters (including bottled gas (LPG)) should only be used in exceptional circumstances and if shown to be acceptable in your risk assessment.

All gas heating appliances should be used only in accordance with manufacturer's instructions and should be serviced annually by a competent person.

In general, staff should be discouraged from bringing in their own portable heaters and other electrical equipment (e.g. kettles) into the premises.

Cooking processes

Typical installations used in cooking processes include deep fat fryers, ovens, grills, surface cookers, ductwork, flues, filters, hoods, extract and ventilation ducts and dampers. These cooking processes can operate at high temperatures, involving large quantities of oil and combustible food stuffs. Heat sources used for cooking processes include: gas, electric and microwave. The main cause of fire are ignition of cooking oil, combustion of crumbs and sediment deposits, and ductwork fires from a build up of fats and grease. The siting of cooking processes close to insulated wall panels with combustible insulation can lead to the likely ignition of the panels and consequent rapid fire spread to other parts of the building. This practice should therefore be avoided.

The following should be considered to reduce the risk from cooking processes:

- ▶ regular cleaning to prevent build-up of crumbs and other combustible material;
- ▶ fire-resisting containers for waste products;
- ▶ a fire suppression system capable of controlling an outbreak of fire;
- ▶ monitored heat/oil levels, even after the cooking process is complete, and installation of temperature control/cut-off/shut-off devices as appropriate;
- ▶ ducts, joints and supports able to withstand high cooking temperatures;
- ▶ separation from wall and ceiling panels (with combustible insulation), e.g. 2.5 m for walls, 4 m for ceilings;
- ▶ insulation of ducts to prevent heating/ignition of nearby combustible wall and ceiling materials;
- ▶ a regular programme for inspection and cleaning;
- ▶ a programme of electrical and mechanical maintenance; and
- ▶ annual service of all gas heating appliances by a competent person.

Smoking

Carelessly discarded cigarettes and other smoking materials are still a major cause of fire. A cigarette can smoulder for several hours, especially when surrounded by combustible material.

Many fires are started several hours after the smoking materials have been emptied into waste bags and left for future disposal.

With the smoke-free legislation concerning enclosed premises this has greatly reduced the risk of fire inside premises. However, the risks can still exist in outside areas and designated smoking shelters. Display the smoke-free signs throughout the premises.

In those areas where smoking is permitted, provide deep and substantial metal ashtrays to help prevent unsuitable containers being used. Empty all ashtrays daily into a metal waste bin and keep it outside. It is dangerous to empty ashtrays into plastic waste sacks which are then left inside for disposal later.

Electrical safety

Electrical equipment can be a significant cause of accidental fires in premises. The main causes are:

- ▶ overheating cables and equipment, e.g. due to overloading circuits, bunched or coiled cables or impaired cooling fans;
- ▶ incorrect installation or use of equipment;
- ▶ little or no maintenance and testing of equipment;
- ▶ incorrect fuse ratings;
- ▶ damaged or inadequate insulation on cables or wiring;
- ▶ combustible materials being placed too close to electrical equipment which may give off heat even

when operating normally or may become hot due to a fault;

- ▶ arcing or sparking by electrical equipment; and
- ▶ embrittlement and cracking of cable sheathing in cold environments.

All electrical equipment should be installed and maintained in a safe manner by a competent person. If portable electrical equipment is used, including items brought into a workplace by staff, then the fire risk assessment should ensure that it is visually inspected and undergoes portable appliance testing (PAT) at intervals suitable for the type of equipment and its frequency of use (see Chapter 11). If there is any doubt about the safety of your electrical installation then you should consult a competent electrician.

Issues to consider include:

- ▶ overloading of equipment;
- ▶ correct fuse ratings;
- ▶ PAT testing and testing of fixed installations;
- ▶ protection against overloading of installation;
- ▶ protection against short circuit;
- ▶ insulation, earthing and electrical isolation requirements;
- ▶ frequency of electrical inspection and test;
- ▶ temperature rating and mechanical strength of flexible cables;
- ▶ portable electrical equipment;
- ▶ physical environment in which the equipment is used (e.g. wet or dusty atmospheres); and
- ▶ suitable use and maintenance of personal protective equipment.

See Chapter 11 for more information.

Systems of work

Safe systems of work have an important part to play in preventing fires. This is particularly important in high hazard areas where dangerous substances are being used. Systems of work may involve a hot work permit where, for example, welding, cutting or burning are taking place and/or a method statement from a contractor stating how hot roof work using heated bitumen will take place. See Chapter 4 for more details.

12.3.2 Safe storage and use of flammable liquids and gases

a) Introduction

The DSEAR apply at most workplaces where a dangerous substance is present or could be present. This is a fire and explosion rather than a health risk, which is covered by COSHH (see Chapter 13). The employer must:

- ▶ carry out a risk assessment of any work activities involving dangerous substances;
- ▶ provide a way of eliminating or reducing risks as far as is reasonably practicable;

- ▶ provide procedures and equipment to deal with accidents and emergencies;
- ▶ provide training and information for employees;
- ▶ classify places where explosive atmospheres may occur into zones and mark the zones where necessary.

The NEBOSH General Certificate includes the storage of flammable liquids in workrooms and other locations. This is covered by the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) and an approved code of practice L138 2nd edition, which are given as reference documents. Some of the information provided here goes beyond the storage of small quantities but is given to provide some background information to managers in process industries.

The Regulations give a detailed definition of 'dangerous substance', which should be referred to for more information. They include any substance or preparation which, because of its properties or the way it is used, could be harmful because of fires and explosions. The list includes petrol, LPG, paints, varnishes, solvent and some dusts. These are dusts which, when mixed with air, can cause an explosive atmosphere. Dusts from milling and sanding operations are examples of this. Most workplaces contain a certain amount of dangerous substances.

An explosive atmosphere is an accumulation of gas, mist, dust or vapour, mixed with air, which has the potential to catch fire or explode. Although an explosive atmosphere does not always result in an explosion (detonation), if it catches fire, flames can quickly travel through the workplace. In a confined space (e.g. in a tank or equipment) the rapid spread of the flame front or in pressure can itself cause an explosion and rupture of the plant and/or building. For a detailed summary of the Regulations, see Chapter 15.

b) Risk assessment

This is the process of identifying and carefully examining the dangerous substances present or likely to be present in the workplace, the work activities involving them and how they might fail and cause fire, explosion and similar events that could harm employees and the public. The purpose of a risk assessment is to enable the employer to decide what needs to be done to eliminate or reduce the safety risks from dangerous substances as far as is reasonably practicable. It should take account of the following:

- ▶ what hazardous properties the substances have;
- ▶ the way they are used and stored;
- ▶ the possibility of hazardous explosive atmospheres occurring;
- ▶ any potential ignition sources.

Regardless of the quantity of dangerous substance present, the employer must carry out a risk assessment. This will enable them to decide whether

existing measures are sufficient or whether they need to make any additional controls or precautions. Non-routine activities need to be assessed as well as the normal activities within the workplace. For example in maintenance work, there is often a higher potential for fire and explosion incidents to occur.

Unless the employer has already carried out a detailed assessment under the Management Regulations, there must be an assessment of the risks from fire, explosion and other events arising from dangerous substances, including addressing requirements specified by DSEAR. This is separate from the Fire Risk assessment made under the RRFSO as Dangerous Substances are considered to be process risks covered by the HSW Act.

Employers are required to ensure that the safety risks from dangerous substances are eliminated or, when this is not reasonably practicable, to take measures to control risks and to reduce the harmful effects of any fire, explosion or similar events, so far as is reasonably practicable.

c) Substitution

Substitution is the best solution. It is much better to replace a dangerous substance with a substance or process that totally eliminates the risk. In practice this is difficult to achieve; so it is more likely that the dangerous substance will be replaced with one that is less hazardous (e.g. by replacing a low-flashpoint solvent with a high-flashpoint one).

Designing the process so that it is less dangerous is an alternative solution. For example a change could be made from a batch production to a continuous production process, or the manner or sequence in which the dangerous substance is added could be altered. However, care must be taken when carrying out these steps to make sure that no other new safety or health risks are created or increased, as this would outweigh the improvements implemented as a result of DSEAR.

The fact is that where a dangerous substance is handled or stored for use as a fuel, there is often no scope to eliminate it and very little chance to reduce the quantities handled.

Where risk cannot be entirely eliminated, control and mitigation measures should be applied. This should reduce risk as follows.

d) Control measures

Control measures should be applied in the following order of priority:

- ▶ reduce the amount of dangerous substances to a minimum;
- ▶ avoid or minimise releases;
- ▶ control releases at source;

- ▶ prevent the formation of an explosive atmosphere;
- ▶ use a method such as ventilation to collect, contain and remove any releases to a safe place;
- ▶ avoid ignition sources;
- ▶ avoid adverse conditions (e.g. exceeding the limits of temperature or other control settings) that could lead to danger;
- ▶ keep incompatible substances apart.

e) Mitigation measures

Choose mitigation measures which are consistent with the risk assessment and appropriate to the nature of the activity or operation. These can include:

- ▶ preventing fires and explosions from spreading to other plant and equipment or to other parts of the workplace;
- ▶ making sure that a minimum number of employees is exposed;
- ▶ in the case of a process plant, providing plant and equipment that can safely contain or suppress an explosion, or vent it to a safe place.

In workplaces where explosive atmospheres may occur, employers should ensure that:

- ▶ areas where hazardous explosive atmospheres may occur are classified into zones based on their likelihood and persistence;
- ▶ areas classified into zones are protected from sources of ignition by selecting suitable special equipment and protective systems;
- ▶ where necessary, areas classified into zones are marked with a specified 'EX' sign at their points of entry;
- ▶ employees working in zoned areas must be provided with appropriate clothing that does not create a risk of an electrostatic discharge igniting the explosive atmosphere;
- ▶ before coming into operation for the first time, areas where hazardous explosive atmospheres may be present are confirmed as being safe (verified) by a person (or organisation) competent in the field of explosion protection. The person carrying out the verification must be competent to consider the particular risks at the workplace and the adequacy of control and other measures put in place.

f) Storage

Dangerous substances should be kept in a safe place in a separate building or the open air. Only small quantities of dangerous substances should be kept in a workroom or area as follows.

For flammable liquids that have a flashpoint above the maximum ambient temperature (normally taken as 32°C), the small quantity that may be stored in the workroom is considered to be an amount up to 250 litres.

For extremely and highly flammable liquids and those flammable liquids with a flashpoint below the maximum ambient temperature, the small quantity is considered to be up to 50 litres and this should be held in a special metal cupboard or container (Figure 12.14(a) and (b)).

Any larger amounts, which cannot be kept outside in a safe area, should be kept in a special fire-resisting store (Figure 12.14(c)), which should be:

- ▶ properly ventilated;
- ▶ provided with spillage retaining arrangements such as sills;
- ▶ free of sources of ignition, such as unprotected electrical equipment, sources of static electrical sparks, naked flames or smoking materials;
- ▶ arranged so that incompatible chemicals do not become mixed together either in normal use or in a fire situation,
- ▶ of fire-resisting construction;
- ▶ used for empty as well as full containers – all containers must be kept closed;
- ▶ kept clear of combustible materials such as cardboard or foam plastic packaging materials.

g) Flammable gases

Flammable gas cylinders also need to be stored and used safely. The following guidance should be adopted:

- ▶ Both full and empty cylinders should be stored outside. They should be kept in a separate secure compound at ground level with sufficient ventilation. Open mesh is preferable.
- ▶ Valves should be uppermost during storage to retain them in the vapour phase of the LPG.
- ▶ Cylinders must be protected from mechanical damage. Unstable cylinders must be together, for example, and cylinders must be protected from the heat of the summer sun.
- ▶ The correct fittings must be used. These include hoses couplers, clamps and regulators.
- ▶ Gas valves must be turned off after use at the end of the shift.
- ▶ Precautions must be taken to avoid welding flame 'flash back' into the hoses or cylinders. People need training in the proper lighting up and safe systems of work procedures; non-return valves and flame arrestors also need to be fitted.
- ▶ Cylinders must be changed in a well-ventilated area remote from any sources of ignition.
- ▶ Joints should be tested for gas leaks using soapy/ detergent water – never use a flame.
- ▶ Flammable material must be removed or protected before welding or similar work.
- ▶ Cylinders should be positioned outside buildings with gas piped through in fixed metal piping.
- ▶ Both high and low ventilation must be maintained where LPG applications are being used.
- ▶ Flame failure devices are necessary to shut off the gas supply in the event of flame failure.

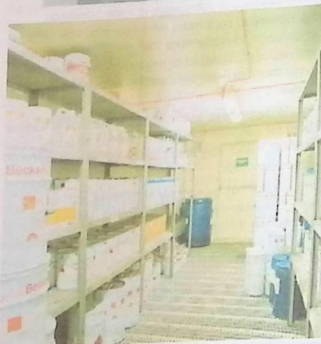


Figure 12.14 Various storage arrangements for highly flammable liquids

h) Aerosols

Some aerosols can contain flammable products stored at pressure and they can present a high level of hazard. When ignited they can explode, produce fireballs and rocket to distances of 40 m. Their presence in premises can make it unsafe for fire-fighters to enter a building and they have the potential for starting multiple fires.

The following should be considered to reduce these risks:

- ▶ All staff involved in the movement, storage and display of aerosol cans should be adequately instructed, trained and supervised.
- ▶ Damaged and leaking aerosol cans should be removed immediately to a safe, secure, well-ventilated place prior to disposal.
- ▶ Powered vehicles should not be used to move damaged stock, unless specially adapted for use in flammable atmospheres.
- ▶ Arrangements should be made for disposal at a licensed waste management facility.

12.3.3 Principles of fire protection in buildings

a) General

The design of all new buildings and the design of extensions or modifications to existing buildings must be approved by the local planning authority.

Design data for new and modified buildings must be retained throughout the life of the structure.

Building legal standards are concerned mainly with safety of life. Therefore, it is necessary to consider the early stage of fire and how it affects the means of escape, and, also, aim to prevent eventual spread to other buildings.

Asset protection requires extra precautions that will have an effect at both early and later stages of the fire growth by controlling fire spread through and between buildings and preventing structural collapse. However, this extra fire protection will also improve life safety not only for those escaping at the early stages of the fire but also for fire-fighters who will subsequently enter.

If a building is carefully designed and suitable materials are used to build it and maintain it, then the risk of injury or damage from fire can be substantially reduced. Three objectives must be met:

- ▶ it must be possible for everyone to leave the building quickly and safely;
- ▶ the building must remain standing for as long as possible;
- ▶ the spread of fire and smoke must be reduced.

These objectives can be met through the selection of materials and design of buildings.

b) Fire loading

The fire load of a building is used to classify types of building use. It may be calculated simply by multiplying the weight of all combustible materials by their energy values and dividing by the floor area under consideration. The higher the fire load, the more the effort needed to offset this by building to higher standards of fire resistance.

c) Surface spread of fire

Combustible materials, when present in a building as large continuous areas, such as for lining walls and ceilings, readily ignite and contribute to spread of fire over their surfaces. This can represent a risk to life in buildings, particularly where walls of fire-escape routes and stairways are lined with materials of this nature.

Materials are tested by insurance bodies and fire research establishments. The purpose of the test is to classify materials according to the tendency for flame to spread over their surfaces. As with all standardised test methods, care must be taken when applying test results to real applications.

In the UK, a material is classified as having a surface in one of the following categories:

Class 1 – Surface of very low flame spread;

Class 2 – Surface of low flame spread;

Class 3 – Surface of medium flame spread;

Class 4 – Surface of rapid flame spread.

The test shows how a material would behave in the initial stages of a fire.

As all materials tested are combustible, in a serious fire they would burn or be consumed. Therefore, there is an additional Class 0 of materials which are noncombustible throughout or, under specified conditions, noncombustible on one face and combustible on the other. The spread of flame rating of the combined Class 0 product must not be worse than that for Class 1.

The Building Regulations use three of these classes in their Approved Document for lining materials as follows:

Class 0: Materials suitable for circulation spaces and escape routes

Such materials include brickwork, blockwork, concrete, ceramic tiles, plaster finishes (including rendering on wood or metal lathes), wood-wool cement slabs and mineral fibre tiles or sheets with cement or resin binding.

Note: Additional finishes to these surfaces may be detrimental to the fire performance of the surface and if there is any doubt about this then consult the manufacturer of the finish.

Class 1: Materials suitable for use in all rooms but not on escape routes

Such materials include all the Class 0 materials referred to above. Additionally, timber, hardboard,

block-board, particle board, heavy flock wallpapers and thermosetting plastics will be suitable if flame-retardant treated to achieve a Class 1 standard.

Class 3: Materials suitable for use in rooms of less than 30 m²

Such materials include all those referred to in Class 1, including those that have not been flame-retardant treated and certain dense timber or plywood and standard glass-reinforced polyesters.

The equivalent European classification standard will also be acceptable. Further details about internal linings and classifications are available in *The Building Regulations 2010* (see Chapter 15.35.1): *Approved document B Fire Safety*. The Stationery Office. ISBN 0 11 753911-2. Appropriate testing procedures are detailed in BS 476-7 and where appropriate BS EN 13501-1.

d) Fire resistance of structural elements

If structural elements such as walls, floors, beams, columns and doors are to provide effective barriers to fire spread and to contribute to the stability of a building, they should be of a required standard of fire resistance.

In the UK, tests for fire resistance are made on elements of structure, full size if possible, or on a representative portion having minimum dimensions of 3 m long for columns and beams and 1 m² for walls and floors. All elements are exposed to the same standard fire provided by furnaces in which the temperature increases with time at a set rate. The conditions of exposure are appropriate to the element tested. Free-standing columns are subjected to heat all round, and walls and floors are exposed to heat on one side only. Elements of structure are graded by the length of time they continue to meet three criteria:

- ▶ the element must not collapse;
- ▶ the element must not develop cracks through which flames or hot gases can pass;
- ▶ the element must have enough resistance to the passage of heat so the temperature of the unexposed face does not rise by more than a prescribed amount.

The term fire resistance has a precise meaning. It should not be applied to such properties of materials as resistance to ignition or resistance to flame propagation. For example steel has a high resistance to ignition and flame propagation but will distort quickly in a fire and allow the structure to collapse – it therefore has poor ‘fire resistance’ (Figure 12.15). It must be insulated to provide good fire protection. This is normally done by encasing steel frames in concrete.

In the past, asbestos has been made into a paste and plastered onto steel frames, giving excellent fire protection, but it has caused major health problems and its use in new work is banned.

Building materials with high fire resistance are, for example, brick, stone, concrete, very heavy timbers (the



Figure 12.15 Steel structures can collapse in the event of a fire

outside chars and insulates the inside of the timber and some specially made composite materials use fire doors.

e) Insulating materials

Building materials used for thermal or sound insulation could contribute to the spread of fire. Only approved fire-resisting materials should be used. Many buildings have insulated core panels as exterior cladding or for internal structures and partitions (Figure 12.16). The food industry, in particular, uses insulated core panels because they are easy to clean and facilitate consistent temperature control within the premises. The simple construction of these panels enables alterations and for additional internal partitions to be erected with minimum disruption to business.

They normally consist of a central insulated core, sandwiched between an inner and outer metal skin. There is no air gap. The external surface is then normally coated with a PVC covering to improve weather resistance or the aesthetic appeal of the panel. The central core can be made of various insulating materials ranging from virtually non-combustible through to highly combustible. Differing fire hazards are associated with common types of insulation, when the panels are subjected to certain temperatures. Typical examples are:

- ▶ Mineral rock/modified phenolic will produce surface char and little smoke or gaseous combustion products, at temperatures above 230°C.
- ▶ Polyisocyanurate (PIR)/polyurethane (PUR) will char and will generate smoke and gaseous combustion products, at temperatures above 430°C PIR and 300°C PUR.
- ▶ Expanded polystyrene (EPS) will melt and will generate smoke and gaseous combustion products, at temperatures above 430°C.

Insulation charring can lead to panel delamination/collapse, and the gaseous combustion products can fill areas with the toxic gases carbon monoxide and styrene. A number of fires in buildings where insulated



Figure 12.16 Insulated core panels

core panels have been used extensively in the fabric of the building have highlighted the particular dangers that may be associated with this form of construction, i.e. where the fabric of the building can contribute to the fire hazard. For more information see: <http://www.communities.gov.uk/fire/firesafety/firesafetylaw/aboutguides/>

f) Fire compartmentation

A compartment is a part of a building that is separated from all other parts by walls and floors, and is designed to contain a fire for a specified time.

The principal object is to limit the effect of both direct fire damage and consequential business interruption caused by not only fire spread but also smoke and water damage in the same floor and other storeys.

Buildings are classified into purpose groups, according to their size. To control the spread of fire, any building whose size exceeds that specified for its purpose group must be divided into compartments that do not exceed the prescribed limits of volume and floor area. Otherwise, they must be provided with special fire protection. In the UK, the normal limit for the size of a compartment is 7,000 m³. Compartments must be separated by walls and floors of sufficient fire resistance. Any openings needed in these walls or floors must be protected by fire-resisting doors to ensure proper fire-tight separation.

Ventilation and heating ducts must be fitted with fire dampers where they pass through compartment walls and floors. Firebreak walls must extend completely across a building from inside wall to outside wall. They must be stable; they must be able to stand even when the part of the building on one side or the other is destroyed.

No portion of the wall should be supported on unprotected steelwork nor should it have the ends of unprotected steel members embedded in it. The wall must extend up to the underside of a non-combustible

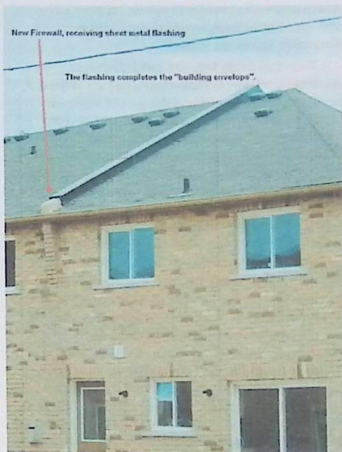


Figure 12.17 Firebreak wall between dwellings

roof surface, and sometimes above it. Any openings must be protected to the required minimum grade of fire resistance. If an external wall joins a firebreak wall and has an opening near the join, the firebreak wall may need to extend beyond the external wall.

An important function of external walls is to contain a fire within a building, or to prevent fire spreading from outside.

The fire resistance of external walls should be related to the:

- ▶ purpose for which the building is used;
- ▶ height, floor area and volume of the building;
- ▶ distance of the building from relevant boundaries and other buildings;
- ▶ extent of doors, windows and other openings in the wall.

A wall which separates properties from each other should have no doors or other openings in it.

12.3.4 Electrical and other equipment in potentially flammable atmospheres

Most electrical equipment either sparks in normal operation or is liable to spark under fault conditions. Some electrical appliances such as electric heaters are specifically designed to produce high temperatures. These circumstances create fire and explosion hazards, which demand very careful assessment in locations

where processes capable of producing flammable concentrations of gas or vapour are used, or where flammable liquids are stored.

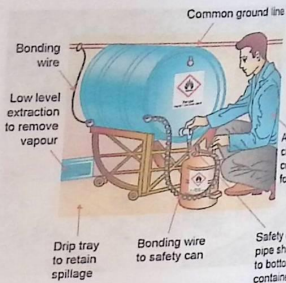
It is likely that many fires are caused by static electrical discharges. Static electricity can, in general, be eliminated by the careful design and selection of materials used in equipment and plant, and the materials used in products being manufactured. When it is impractical to avoid the generation of static electricity, a means of control must be devised. Where flammable materials are present, especially if they are gases or dusts, then there is a great danger of fire and explosion, even if there is only a small discharge of static electricity. The control and prevention of static electricity is considered in more detail later.

The use of electrical equipment in potentially flammable atmospheres should be avoided as far as possible. However, there will be many cases where electrical equipment must be used and, in these cases, the standards for the construction of the equipment should comply with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations, known as ATEX. Details on the classification or zoning of areas are contained in the Dangerous Substances and Explosive Atmospheres Regulations and ACoPs.

Before electrical equipment is installed in any location where flammable vapours or gases may be present, the area must be zoned in accordance with the Dangerous Substances and Explosive Atmosphere Regulations, and records of the zoned areas must be marked on building drawings and revised when any zoned area is changed. The installation and maintenance of electrical equipment in potentially flammable atmospheres is a specialised task. It must only be undertaken by electricians or instrument mechanics who are trained to ATEX standards.

Static electricity is produced by the build-up of electrons on weak electrical conductors or insulating materials. These materials may be gaseous, liquid or solid and may include flammable liquids, powders, plastic films and granules. Plastics have a high resistance that enables them to retain static charges for long periods of time. The generation of static may be caused by the rapid separation of highly insulated materials by friction or by transfer from one highly charged material to another in an electric field by induction (see Figure 12.18).

A static electric shock, perhaps caused by closing a door with a metallic handle, can produce a voltage greater than 10,000V. Since the current flows for a very short period of time, there is seldom any serious harm to an individual. However, discharges of static electricity may be sufficient to cause serious electric shock and are always a potential source of ignition when flammable liquid, dusts or powders are present. This is a particular problem in the parts of the printing industry



Dispensing Flammable Liquids

Figure 12.18 Safe dispensing of flammable liquids

where solvent-based inks are used on high-speed presses. Flour dust in a mill has also been ignited by static electricity.

Static electricity may build up on both materials and people. When a charged person approaches flammable gases or vapours and a spark ignites the substance, resulting explosion or fire often causes serious injury. In these situations, effective static control systems must be used which includes:

- ▶ bonding or earthing continuity between pieces of equipment, particularly portable equipment such as containers for carrying highly flammable substances, piping, filling funnels, drip trays and the like;
- ▶ not wearing outer clothing which generates static charges. In practice this usually means avoiding man-made fibres and using cotton only;
- ▶ using conductive footwear to leak static charges to ground (these must not be used by electricians as they conduct electricity and will not protect them against electric shock);
- ▶ avoiding the free fall of highly flammable liquids from one container to another unless anti-static additives have been put into the liquid or its natural properties will not hold static charges. Filling funnels should reach down to near the bottom of the container being filled.

For more information see Chapter 11 on electrical hazards.

12.4 Fire alarm system and fire-fighting arrangements

12.4.1 Fire detection and alarm systems

In the event of fire, it is vital that everyone in the workplace is alerted as soon as possible. The earlier the

fire is discovered, the more likely it is that people will be able to escape before the fire takes hold and before it blocks escape routes or makes escape difficult.

Every workplace should have detection and warning arrangements. Usually the people who work there will detect the fire and in many workplaces nothing further will be needed.

In small workplaces where occupancy is low, a shouted warning should be all that is needed, so long as the warning can be heard and understood everywhere on the premises. Where a simple shout of 'fire' or the operation of a manual device such as a gong, whistle or air horn is not adequate to warn everyone when operated from any single point within the building, it is likely that an electrical fire warning system may be required. This will typically include the following:

- ▶ manual call points (break-glass call points) at storey exit and final exit doors;
- ▶ electronic sirens or bells; and
- ▶ a simple control and indicator panel

In some cases a heat or smoke detector will also be fitted in the system (see Figure 12.19).

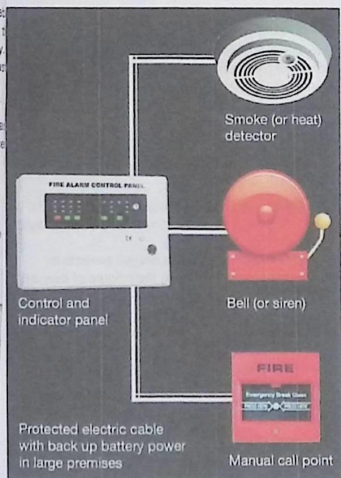


Figure 12.19 Simple electrical fire alarm system components

Some premises (e.g. a community centre) may only require a few interconnected manual call points and sounders. Other premises (e.g. a multilevel pub, or factory) may require a more complex warning system

involving staff action. If a building has areas where a fire could develop undetected or where people work alone and might not see a fire (e.g. storerooms or warehouses), then it may be necessary to upgrade the fire warning system to incorporate some form of automatic fire detection (e.g. in some circumstances, this could be a series of interconnected smoke alarms, if shown to be acceptable in the risk assessment).

If the system fails, people in the premises still need to be warned and escape safely. A temporary arrangement, such as gongs, whistles or air horns, combined with suitable training, may be acceptable for a short period pending system repairs. All systems should be properly installed to recognised standards with an auxiliary power source, if temporary manual alarms would be unacceptable. Cables need protecting from fire by using mineral-insulated, copper-sheathed, silicone-rubber insulated or other approved fire-resistant cabling.

The fire warning sound levels should be loud enough to alert everyone, taking into account background noise, any other sound systems should be muted (automatically or manually) when the fire alarm sounds. In areas of high background noise, or where people may be wearing hearing protectors, the audible warning should be supplemented, e.g. with visual or even vibratory alarms.

People with hearing difficulties

Where people have hearing difficulties, particularly those who are profoundly deaf, then simply hearing the fire warning is likely to be the major difficulty. If these people are never alone while on the premises then this may not be a serious problem, as it would be reasonable for other occupants to let them know that the building should be evacuated. If a person with hearing difficulties is likely to be alone, then consider other means of raising the alarm. Among the most popular are visual beacons and vibrating devices or pagers that are linked to the existing fire alarm.

Voice alarms

Research has shown that some people and, in particular, members of the public, do not always react quickly to a conventional fire alarm. Voice alarms are therefore becoming increasingly popular and can also incorporate a public address facility. The message or messages sent must be carefully considered. It is therefore essential to ensure that voice-alarm systems are designed and installed by a person with specialist knowledge of these systems.

Schematic plan

In order to quickly determine where a fire has been detected, managers should consider displaying a schematic plan showing fire alarm zones in a multi-zoned system adjacent to the control panel.

Manual call points

Manual call points, often known as 'break-glass' call points, enable a person who discovers a fire to immediately raise the alarm and warn other people in the premises of the danger.

People leaving a building because of a fire will normally leave by the way they entered. Consequently, manual call points are normally positioned at exits and storey exits that people may reasonably be expected to use in case of fire, not just those designated as fire exits. However, it is not necessary in every case to provide call points at every exit.

Manual call points should normally be positioned so that, after all fixtures and fittings, machinery and stock are in place, no one should have to travel more than 45 m to the nearest alarm point. This distance may be less if the premises cater for people of limited mobility or there are particularly hazardous areas. They should be conspicuous (red), fitted at a height of about 1.4 m (or less for premises with a significant number of wheelchair users), and not in an area likely to be obstructed.

Automatic fire detection

It is important to consider how long a fire is likely to burn before it is discovered. Fires are likely to be discovered quickly if they occur in places that are frequently visited by employees, or in occupied areas of a building. For example, employees are likely to smell burning or smoke. If it is thought that there might be some delay in fire being detected, automatic fire detection should be considered, linked into an electrical fire alarm system.

Automatic fire detection may be needed for a number of reasons. These can include:

- ▶ if there are areas where people are isolated or remote and could become trapped by a fire because they are unaware of its development, such as lone workers;
- ▶ sleeping accommodation is provided;
- ▶ if there are areas where a fire can develop unobserved (e.g. storerooms or warehouse);
- ▶ as a compensating feature, e.g. for inadequate structural fire protection, in dead-ends or where there are extended travel distances; and
- ▶ where smoke control and ventilation systems are controlled by the automatic fire-detection system.

An automatic fire detection system should:

- ▶ be designed to accommodate the emergency evacuation procedure;
- ▶ give an automatic indication of the fire warning and its location. If the indicator panel is located in a part of the premises other than the control point (for example, an office) there should ideally be a repeater panel sited in the control point;
- ▶ be maintained and tested by a competent person, and

- ▶ communicate with a central control room (if there is one).

New automatic fire detection systems should be designed and installed by a competent person. Guidance is given in BS 5839-1:16 or a more recent standard where applicable.

Where the public address system is part of the warning system it should be connected to an alternative power source to ensure the continued use of the system in the event of fire or other emergency.

Whichever warning or detection systems are in the fire and rescue service should always be called immediately if a fire occurs. When properly installed and maintained, these systems can be a significant factor in reducing the risk to life and limiting damage to property in the event of a fire. These systems can also enable emergency services to respond very quickly to major emergencies.

Unfortunately, these systems can also produce 'unwanted' fire alarm signals, for example, when signals are triggered by mistake and not because of a fire or a test. The subsequent evacuation can cause unnecessary business disruption and they may mean that emergency services send fire appliances unnecessarily.

'Unwanted' fire alarm signals are a widespread problem and all fire and rescue services are trying to reduce the number of false alarms caused by automatic fire detection systems.

12.4.2 Extinguishing media

There are four main methods of extinguishing fires which are explained as follows:

- ▶ **Cooling** – reducing the ignition temperature by taking the heat out of the fire – using water to cool or reduce the temperature.
- ▶ **Smothering** – limiting the oxygen available by smothering and preventing the mixture of oxygen and flammable vapour – by the use of foam or a blanket.
- ▶ **Starving** – limiting the fuel supply – by removing the source of fuel by switching off electrical power, isolating the flow of flammable liquids or removing wood and textiles, etc.
- ▶ **Chemical reaction** – by interrupting the chain of combustion and combining the hydrogen atoms with chlorine atoms in the hydrocarbon chain, for example with Halon extinguishers. (Halon has generally been withdrawn because of their detrimental effect on the environment, as ozone-depleting agents.)

Advantages and limitations of the main extinguishing media

Fire extinguishers are all red with 5% of the cylindrical area taken up with the colour code. The colour code

band) denotes on which class of fire the extinguisher can be used.

Water extinguishers (red band)

This type of extinguisher can only be used on Class A fires. They allow the user to direct water onto a fire from a considerable distance.

A 9 litre water extinguisher can be quite heavy and some water extinguishers with additives can achieve the same rating, although they are smaller and therefore considerably lighter. This type of extinguisher is not suitable for use on live electrical equipment, liquid or metal fires.

Water extinguishers with additives (red band)

This type of extinguisher is suitable for Class A fires. They can also be suitable for use on Class B fires and, where appropriate, this will be indicated on the extinguisher. They are generally more efficient than conventional water extinguishers.



Figure 12.20 Typical fire point in offices with extinguishers, fire notices and alarm break-glass call point



(a)



(b)



(c)

Figure 12.21 Various fire-fighting equipment: (a) fire blanket; (b) hose reel; (c) fire extinguisher

Foam extinguishers (cream band)

This type of extinguisher can be used on Class A or B fires and is particularly suited to extinguishing liquid fires such as petrol and diesel. They should not be used on free-flowing liquid fires unless the operator has been specially trained, as these have the potential to rapidly spread the fire to adjacent material. This type of extinguisher is not suitable for deep-fat fryers or chip pans. They should not be used on electrical or metal fires.

Powder extinguishers (blue band)

This type of extinguisher can be used on most classes of fire and achieve a good 'knock down' of the fire. They can be used on fires involving electrical equipment but will almost certainly render that equipment useless.

Because they do not cool the fire appreciably, it can re-ignite. Powder extinguishers can create a loss of visibility and may affect people who have breathing problems and are not generally suitable for confined spaces. They should not be used on metal fires.

Carbon dioxide extinguishers (black band)

This type of extinguisher is particularly suitable for fires involving electrical equipment as they will extinguish a fire without causing any further damage (except in the case of some electronic equipment, for example computers). As with all fires involving electrical equipment, the power should be disconnected if possible. These extinguishers should not be used on metal fires.

Wet chemical – class 'F' extinguishers

This type of extinguisher is particularly suitable for commercial catering establishments with deep-fat fryers. The intense heat in the fluid generated by fat fires means that when standard foam or carbon dioxide extinguishers stop discharging, re-ignition tends to occur.

Wet chemical extinguishers starve the fire of oxygen by sealing the burning fluid, which prevents flammable vapour reaching the atmosphere.

12.4.3 Portable fire-fighting equipment

Since 1 April 2006, employers or those who have control of non-domestic premises have had a statutory duty under fire safety and health and safety legislation to ensure that there are appropriate means of fighting fires. The employer or controller of non-domestic premises is known as the 'responsible person'. The responsible person also has to provide suitably trained people to operate non-automatic fire-fighting equipment.

As Fire Certificates issued by fire authorities under the Fire Precautions Act 1971 have been abolished, instead it is up to the responsible person to identify the fire-

fighting requirement for their premises. If fire breaks out in the workplace and trained staff can safely extinguish it using suitable fire-fighting equipment, the risk to others will be removed. Therefore, all workplace premises where people are at risk from fire should be provided with suitable fire-fighting equipment.

The most useful form of fire-fighting equipment for general fire risks is the water-type portable extinguisher or suitable alternative. One such extinguisher should be provided for around each 200 m² of floor space with a minimum of one per floor. If each floor has a hose reel which is known to be in working order and of sufficient length for the floor it serves, there may be no need for water-type extinguishers to be provided.

Areas of special risks involving the use of oil, electrical equipment may need carbon dioxide, powder or other types of extinguisher.

Fire extinguishers should be sited on exit routes, preferably near to exit doors or, where they are not provided for specific risks, near to the hazards they are intended to protect. Notices indicating the location of fire-fighting equipment should be displayed where the location of the equipment is not obvious or in areas of high fire risk where the notice will assist in reducing the risk to people in the workplace.

All Halon fire extinguishers should have been decommissioned as from December 2003 and disposed of safely.

Those carrying out hot work should have appropriate fire extinguishers with them and know how to use them.

The primary purpose of fire extinguishers is to tackle fires at a very early stage to enable people to make their escape. Putting out larger fires is the role of the fire and rescue services.

Extinguishers should conform to a recognised standard BS EN 3:7 Portable Fire Extinguishers. Characteristics, performance requirements and test methods.

CASE STUDY

It is very important to understand the limitations of portable fire-fighting equipment and ensure the safety of people as a first priority. At one cotton mill in the 1980s the author was involved with the investigation of a fire where they used 28 water extinguishers fetched from all over the mill on various floors before sounding the alarm, evacuating the building and calling the fire and rescue services. Fortunately no one was seriously injured but the outcome could so easily have been very tragic indeed. Such equipment should only be used, if safe to do so, by trained people while the building is evacuated and the professionals are called.

















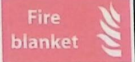


	 Old colour BS 5406	 New colour BS EN3	 Class A Paper or wood etc.	 Class B Flammable liquids	 Class C Flammable gas fires	 Class D Metal fires	 Electrical fires
Red			✓	Do not use ✗			Do not use ✗
Red	 Fire hose reel		✓	Do not use ✗			Do not use ✗
Cream			Note: Multi-purpose foams may be used ✓	Note: Specialist foams required for industrial alcohol ✓			Do not use ✗
Black				Secondary ✓			Primary ✓
Blue			✓	Note: Specialist DP required for solvents and esters ✓	✓	Note: Specialist dry powders may be required ✓	✓
Red	 Fire blanket			Primary ✓	General note – May be used in conjunction with other extinguishing agents or fire extinguishing techniques		
Canary yellow			Specialist hot cooking oil fires only Specifically for dealing with high-temperature (360°C+) cooking oils used in large industrial size catering kitchens, restaurants and takeaway establishments with deep-fat frying facilities				

Figure 12.22 Types of fire extinguishers and labels (Note: main colour of all extinguishers is red with 5% for label)

12.4.4 Fixed fire-fighting equipment – sprinkler installations

Sprinklers should be considered as merely one component part of a total fire safety strategy, which is tailored to the existing and projected needs of a building. They have significant benefits to offer in suppressing fires until those best trained to deal with major incidents are on the scene to extinguish them.

Sprinklers, however, are an emotive topic. In some buildings, they have been used for a long time as the most significant element of a fire safety system. This situation is probably most prolific in warehouses and retail premises. They have unfortunately been resisted in most other buildings because of the initial capital cost and the perceived inherent risk of accidental water discharge.

Sprinkler systems can be very effective in controlling fires. They can be designed to protect life and/or

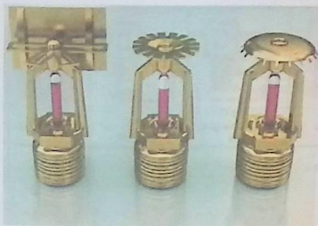


Figure 12.23 Various sprinkler heads designed to fit into a high-level water pipe system and spray water at different angles onto a fire below.

property and may be regarded as a cost-effective solution for reducing the risks created by fire. If a building has a sprinkler installation, it may have been installed as a result of a business decision, for example for the protection of business assets, or it may have been installed as a requirement, for example imposed under a local Act, or an integral part of the building design.

Sprinkler systems should normally extend to the entire building. In a well-designed system, only those heads in the immediate vicinity of the fire will actually operate. Sprinkler installations typically comprise a water supply (preferably a stored water supply incorporating tanks), pumps, pipe work and sprinkler heads. There are different types of sprinkler design; sprinklers can be operated to discharge water at roof or ceiling level or within storage racks. Other design types such as ESFR (early suppression fast response) and dry pipe may also be appropriate. In all cases, a competent person/contractor should be used to provide guidance.

The installation should be designed for the fire hazard, taking into account the building occupancy, the fire load and its burning characteristics and the sprinkler control characteristics. For each hazard the sprinkler installation design should take account of specific matters such as storage height, storage layout, ceiling clearance and sprinkler type (e.g. sprinkler orifice, sprinkler sensitivity).

There are some hazards where sprinklers should not be fitted, such as over salt baths and metal melt pans, because water will possibly cause an explosive reaction.

Any significant changes are being made to the premises, for example changing storage arrangements or material stored, the sprinkler installation should be checked to see that it is still appropriate and expert advice sought as necessary.

Sprinkler protection could give additional benefits, such as a reduction in the amount of portable fire-fighting equipment necessary, and the relaxation of restrictions in the design of buildings.

Guidance on the design and installation of new systems and the maintenance of all systems is given in the Loss Prevention Council (LPC) Rules, BS EN 12845 or BS 5306 and should be carried out only by a competent person.

Routine maintenance by on-site personnel may include checking of pressure gauges, alarm systems, water supplies, any anti-freezing devices and automatic booster pump(s). For example diesel fire pumps should be given a test run for 30 minutes each week.

12.4.5 Inspection, maintenance and testing of fire equipment

It is important that equipment is fit for its purpose and properly maintained and tested. One way in which this can be achieved is through companies that specialise in the test and maintenance of fire-fighting equipment.

All equipment provided to assist escape from the premises, such as fire detection and warning systems and emergency lighting, and all equipment provided to assist with fighting fire, should be regularly checked and maintained by a suitably competent person in accordance with the manufacturer's recommendations. The alarm system should be tested every week, while the premises are in normal use. The test should be carried out by activating a different call point each week, at a fixed time. Table 12.2 gives guidance on the frequency of test and maintenance and provides a simple guide to good practice.

Table 12.2 Maintenance and testing of fire equipment

Equipment	Period	Action
Fire detection and fire warning systems including self-contained smoke alarms and manually operated devices	Weekly	<ul style="list-style-type: none"> • Check all systems for state of repair and operation • Repair or replace defective units • Test operation of systems, self-contained alarms and manually operated devices
	Annually	<ul style="list-style-type: none"> • Full check and test of systems by competent service engineer • Clean self-contained smoke alarms and change batteries
Emergency lighting including self-contained units and torches	Weekly	<ul style="list-style-type: none"> • Operate torches and replace batteries as required • Repair or replace any defective unit
	Monthly	<ul style="list-style-type: none"> • Check all systems, units and torches for state of repair and apparent function
	Annually	<ul style="list-style-type: none"> • Full check and test of systems and units by competent service engineer • Replace batteries in torches
Fire-fighting equipment installation including hose reels	Weekly	<ul style="list-style-type: none"> • Check all extinguishers including hose reels for correct apparent function
	Annually	<ul style="list-style-type: none"> • Full check and test by competent service engineer

12.5 Evacuation of a workplace

12.5.1 Means of escape in case of fire

a) General

It is essential to ensure that people can escape quickly from a workplace if there is a fire. Normally the entrances and exits to the workplace will provide escape routes, particularly if staff have been trained in what to do in case of fire and if it is certain that an early warning will be given.

In modern buildings which have had Building Regulation approval, and where there have not been significant changes to the building or where the workplace has recently been inspected by the fire authorities and found to be satisfactory, it is likely that the means of escape will be adequate. It may occasionally be necessary to improve the fire protection on existing escape routes, or to provide additional exits. In making a decision about the adequacy of means of escape, the following points should be considered:

- ▶ People need to be able to turn away from a fire as they escape or be able to pass a fire when it is very small.
- ▶ If a single-direction escape route is in a corridor, the corridor may need to be protected from fire by fire-resisting partitions and self-closing fire doors
- ▶ Stair openings can act as natural chimneys in fires. This makes escape from the upper parts of some workplaces difficult. Most stairways, therefore, need to be separated from the workplace by fire-resisting partitions and self-closing fire doors. Where stairways serve no more than two open areas, in shops for example, which people may need to use as escape routes, there may be no need to use this type of protection.

b) Doors

Some doors may need to open in the direction of travel, such as:

- ▶ doors from a high-risk area, such as a paint spraying room or large kitchen;
- ▶ doors that may be used by more than 50 persons;
- ▶ doors at the foot of stairways where there may be a danger of people being crushed.

Some sliding doors may be suitable for escape purposes provided that they do not put people using them at additional risk, slide easily and are marked with the direction of opening.

Doors which only revolve and do not have hinged segments are not suitable as escape doors.

c) Escape routes and travel distances

Escape routes should meet the following criteria:

- ▶ Where two or more escape routes are needed they should lead in different directions to places of safety.



Figure 12.24 External fire escape from a multi-story building. Extreme caution needed in winter and enclosure of staircase would be preferred for the UK climate

- ▶ Escape routes need to be short and to lead people directly to a place of safety, such as the open air or an area of the workplace where there is no immediate danger.
- ▶ It should be possible for people to reach the open air without returning to the area of the fire. They should then be able to move well away from the building.
- ▶ Escape routes should be wide enough for the volume of people using them. A 750 mm door will allow up to 40 people to escape in 1 minute, so most doors and corridors will be wide enough. If the routes are likely to be used by people in wheelchairs, the minimum width will need to be 800 mm.
- ▶ While the workplace is in use, it must be possible to open all doors easily and immediately from the inside, without using a key or similar device. Doors must be readily opened in the direction of escape. Fire doors should be self-closing (fire doors to cupboards or lockers can be simply latched or locked).
- ▶ Make sure that there are no obstructions on escape routes, especially on corridors and stairways where people who are escaping could dislodge stored items or be caused to trip. Any fire hazards must be

removed from exit routes as a fire on an exit route could have very serious consequences.

- ▶ Escape routes need regular checks to make sure that they are not obstructed and that exit doors are not locked. Self-closing fire-resisting doors should be checked to ensure doors close fully, including those fitted with automatic release mechanisms.



Figure 12.25 Fire escape route outside building

The maximum advisable travel distances from any area in a workplace to a fire exit door leading out to a relative place of safety should be in accordance with Table 12.3.

Table 12.3 Maximum travel distances

Fire hazard	Lower	Normal	Higher
Enclosed structures:			
Alternative			
Dead-end	60 m	45 m	25 m
	18 m	18 m	12 m
Semi-open structures:			
Alternative			
Dead-end	200 m	100 m	60 m
	25 m	18 m	12 m

Source: HSE

d) Lighting

Escape routes must be well lit. If the route has only artificial lighting or if it is used during the hours of darkness, alternative sources of lighting should be

considered in case the power fails during a fire. The routes when it is dark as, for example, there should be street lighting outside that provides sufficient illumination. In small workplaces it may be necessary to provide the staff with torches that they can use if the power fails. However, it may be necessary to provide battery-operated emergency lights so that if the main lighting fails the lights will operate automatically. Candles, matches and cigarette lighters are not adequate forms of emergency lighting.

e) Signs

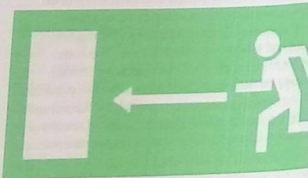


Figure 12.26 International Fire Escape pictorial

Exit signs on doors or indicating exit routes should be provided where they will help people to find a safe escape route. Signs on exit routes should have directional arrows, 'up' for straight on and 'left', 'right' or 'down' according to the route to be taken. Advice on the use of all signs including exit signs can be found in chapters 4 and 15.

f) Escape times

Everyone in the building should be able to get to the nearest place of safety in between 2 and 3 minutes. This means that escape routes should be kept short. Where there is only one means of escape, or where the risk of fire is high, people should be able to reach a place of safety, or a place where there is more than one route available, in 1 minute.

The way to check this is to pace out the routes, walking slowly and noting the time. Start from where people work and walk to the nearest place of safety. Remember that the more people there are using the route, the longer they will take. People take longer to negotiate stairs and they are also likely to take longer if they have a disability.

Where fire drills are held, check how long it takes to evacuate each floor in the workplace. This can be used as a basis for assessment. If escape times are too long, it may be worth rearranging the workplace so that people are closer to the nearest place of safety, rather than undertake expensive alterations to provide additional escape routes.

Reaction time needs to be considered. This is the amount of time people will need for preparation before

they escape. It may involve, for example, closing down machinery, issues of security or helping visitors or members of the public out of the premises. Reaction time needs to be as short as possible to reduce risk to staff. Assessment of escape routes should include this. If reaction times are too long, additional routes may need to be provided. It is important that people know what to do in case of fire as this can lessen the time needed to evacuate the premises.

12.5.2 Evacuation procedures and emergency plans

a) Introduction

Each workplace should have an emergency plan. The plan should include the action to be taken by staff in the event of fire, the evacuation procedure and the arrangements for calling the Fire and Rescue Authority.

For small workplaces, this could take the form of a simple fire action notice posted in positions where staff can read it and become familiar with it.

High fire-risk or larger workplaces will need more detailed plans, which take account of the findings of the risk assessment, for example the staff significantly at risk and their location. For large workplaces, notices giving clear and concise instructions of the routine to be followed in case of fire should be prominently displayed. The notice should include the method of raising an alarm in the case of fire and the location of an assembly point to which staff escaping from the workplace should report (see Figure 12.27).

b) Fire routines

Site managers must make sure that all employees are familiar with the means of escape in case of fire and their use, and with the routine to be followed in the event of fire.

To achieve this, routine procedures must be set up and made known to all employees, generally outlining the action to be taken in case of fire and specifically laying down the duties of certain nominated persons. Notices should be posted throughout the premises.

While the need in individual premises may vary, there are a number of basic components which should be considered when designing any fire routine procedures:

- ▶ the action to be taken on discovering a fire;
- ▶ the method of operating the fire alarm;
- ▶ the arrangements for calling the fire and rescue services;
- ▶ the stopping of machinery and plant;
- ▶ first-stage fire-fighting by employees;
- ▶ evacuation of the premises;
- ▶ assembly of staff, customers and visitors, and carrying out a roll-call to account for everyone on the premises.

The procedures must take account of those people who may have difficulty in escaping quickly from a building because of their location or a disability. Insurance companies and other responsible people may need to be consulted where special procedures are necessary to protect buildings and plant during or after people have been evacuated. For example there may be some special procedures necessary to ensure that a sprinkler system is operating in the event of fire.

c) Supervisory duties/fire marshals

A member of the staff should be nominated to supervise all fire and emergency arrangements. This person should be in a senior position or at least have direct access to a senior manager. Senior members of the staff should be appointed as departmental fire marshals, with deputies for every occasion of absence, however brief. In the event of fire or other emergency, their duties would be, while it remains safe to do so, to ensure that:

- ▶ the alarm has been raised;
- ▶ the whole department, including toilets and small rooms, has been evacuated;
- ▶ the fire and rescue service has been called;
- ▶ fire doors are closed to prevent fire spread to adjoining compartments and to protect escape routes;
- ▶ plant and machinery are shut down wherever possible and any other actions required to safeguard the premises are taken where they do not expose people to undue risks;
- ▶ a roll-call is carried out at the assembly point and the result reported to whoever is in control of the evacuation.

Under normal conditions, fire marshals should check that good standards of housekeeping and preventative maintenance exist in their department, that exits and escape routes are kept free from obstruction, that all fire-fighting appliances are available for use and fire points are not obstructed, that smoking is rigidly controlled, and that all members of staff under their control are familiar with the emergency procedure and know how to use the fire alarm and fire-fighting equipment.

d) Assembly and roll-call

Assembly points should be established for use in the event of evacuation. They should be in positions, preferably under cover, which are unlikely to be affected at the time of fire. In some cases, it may be necessary to make mutual arrangements with the occupiers of nearby premises.

In the case of small premises, a complete list of the names of all staff should be maintained so that a roll-call can be made if evacuation becomes necessary.

In those premises where the number of staff would make a single roll-call difficult, each departmental fire warden should maintain a list of the names of staff in their area. Roll-call lists must be updated regularly.

e) Fire notices

Printed instructions for the action to be taken in the event of fire should be displayed throughout the premises. The information contained in the instructions should be stated briefly and clearly. The staff and their deputies to whom specific duties are allocated should be identified.

Instruction for the immediate calling of the fire brigade in case of fire should be displayed at telephone

switchboards, exchange telephone instruments and security lodges.

A typical fire notice is given in Appendix 12.2.

f) Fire drills

Once a fire routine has been established, it must be tested at regular intervals in order to ensure that staff are familiar with the action to be taken in an emergency.

The most effective way of achieving this is by carrying out fire drills at prescribed intervals. Drills should be held at least twice a year, other than in areas dealing with hazardous processes where they should be more frequent. A programme of fire drills should be planned to ensure that all employees, including shift workers and part-time employees, are covered.

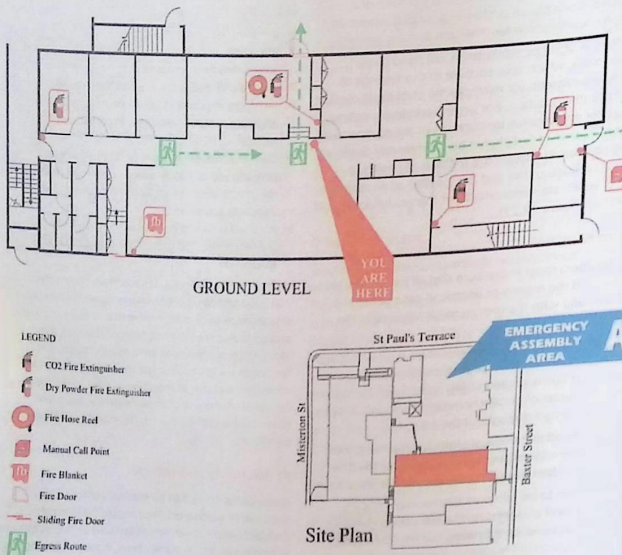


Figure 12.27 Fire evacuation diagram

12.5.3 People with special needs

a) General

Of all the people who may be especially at risk, employers will need to pay particular attention to people who have special needs, including those with a disability. The Equality and Human Rights Commission estimates that 11 million people in this country have some form of disability, which may mean that they find it more difficult to leave a building if there is a fire. Under the Equalities Act 2010 if people with a disability could realistically expect to use premises, then employers or those in charge of premises must anticipate any reasonable adjustments that would make it easier for that right to be exercised.

The Equalities Act includes the concept of 'reasonable adjustments' and this can be carried over into fire safety law. It can mean different things in different circumstances. For a small business, it may be considered reasonable to provide contrasting colours on a handrail to help people with vision impairment to follow an escape route more easily. However, it might be unreasonable to expect that same business to install an expensive voice alarm system. Appropriate 'reasonable adjustments' for a large business or organisation may be much more significant.

Where people with special needs use or work on the premises, their needs should, so far as is practicable, be discussed with them. These will often be modest and may require only changes or modifications to existing procedures. You may need to develop individual 'personal emergency evacuation plans' (PEEPs) for disabled persons who frequently use a building. They will need to be confident of any plan/PEEP that is put in place after consultation with them. As part of your consultation exercise you will need to consider the matter of personal dignity.

If members of the public use the building, then those in control may need to develop a range of standard PEEPs which can be provided on request to a disabled person or others with special needs.

Guidance on removing barriers to the everyday needs of disabled people is in BS 8300. Much of this advice will also help disabled people during an evacuation.

Advice on the needs of people with a disability, including sensory impairment, is available from the organisations which represent various groups. (Names and addresses can be found through an internet search.)

Many businesses have discovered the problem of reconciling their duties under the Equalities Act and RRFSO.

Employers need to consider the needs of all their staff and users of their building when fire evacuation strategies are being considered. This can include people with a surprisingly diverse range of access needs, not just those with perhaps more obvious disabilities

such as wheelchair users. But access and egress for each of these groups can sometimes seem hard to reconcile with tightly controlled fire safety. For example Building Regulations require internal doors held open by electromagnetic devices to self-close when activated by smoke detectors, but a disabled person may not be able to open a heavy fire door once it has closed.

So what is more important, fulfilling fire safety requirements or fulfilling the requirements of the Equalities Act?

Essentially, fire safety concerns life-threatening incidents, the EA is about dignity and equal treatment. Basically, health and safety (including fire) overrides EA if there is a conflict. However, there really should not be a problem achieving both. In respect of fire, it is never acceptable to refuse someone entry to an upper level on the basis of there not being an evacuation lift available. However, it is acceptable to pre-plan and decide to hold public meetings on the ground floor for this reason.

In other words, it should be possible to comply with fire safety legislation and comply with the EA, as long as there are management procedures in place to make sure both are adhered to successfully. In many cases, the answer lies in planning ahead, and implementing procedures which may involve other staff in personal evacuation plans, for example.

b) Special needs, fire emergencies and precautions

If people with a disability are going to be in the premises, then employers must also provide a safe means for them to leave if there is a fire. Staff should be aware that people with a disability may not react, or can react differently, to a fire warning or a fire. You should give similar consideration to others with special needs such as parents with young children or the elderly.

In premises with a simple layout, a common-sense approach, such as offering to help lead a blind person or helping an elderly person down steps, may be enough. In more complex premises, more elaborate plans and procedures will be needed, with trained staff assigned to specified duties.

Consider the needs of people with mental disabilities or spatial recognition problems. The range of disabilities encountered can be considerable, extending from mild epilepsy to complete disorientation in an emergency situation. Many of these can be addressed by properly trained staff, discreet and empathetic use of the 'buddy system' or by careful planning of colour and texture to identify escape routes.

People with special needs (including members of the public) need special consideration when planning for emergencies. But the problems this raises are seldom great. Employers should:

- ▶ identify everyone who may need special help to get out;
- ▶ allocate responsibility to specific staff to help people with a disability in emergency situations;
- ▶ consider possible escape routes;
- ▶ enable the safe use of lifts;
- ▶ enable people with a disability to summon help in emergencies;
- ▶ train staff to be able to help their colleagues;
- ▶ consider safe havens.

People with impaired vision must be encouraged to familiarise themselves with escape routes, particularly those not in regular use. A 'buddy' system would be helpful. But, to take account of absences, more than one employee working near anyone with impaired vision should be taught how to help them.



'exitmaster' stairway evacuation chairs for persons with disabilities or who cannot manage steps / stairs are located as follows:

Figure 12.28 Special addition to the fire notice for people with a disability

Where people have hearing difficulties, particularly those who are profoundly deaf, then simply hearing the fire warning is likely to be the major difficulty. If these persons are never alone while on the premises then this may not be a serious problem, as it would be reasonable to ask other occupants to let them know that the building could be evacuated. If a person with hearing difficulties is likely to be alone, then consider other means of raising the alarm. Among the most popular are visual beacons and vibrating devices or pagers that are linked to the existing fire alarm.

People with impaired hearing may not hear alarms in the same way as those with normal hearing but may still be able to recognise the sound. This may be tested during the weekly alarm audibility test. There are alternative means of signalling, such as lights or other visual signs, vibrating devices or specially selected sound signals.

The Royal National Institute for Deaf People (19–23 Featherstone St, London EC1) can advise. Ask the fire brigade before installing alternative signals.

Wheelchair users or others with impaired mobility may need help to negotiate stairs, etc. Anyone selected to provide this help should be trained in the correct

methods. Advice on the lifting and carrying of people can be obtained from the Fire and Rescue Service, Ambulance Service, British Red Cross Society, St John's Ambulance Brigade or certain disability organisations. Lifts should not be used as a means of escape in the event of a fire. If the power fails, the lift could stop between floors, trapping occupants in what may become a chimney of fire and smoke. But BS 5838 provides advice on specially designed lifts for use by people with a disability in the event of a fire.

Employees with learning difficulties may also require special provision. Management should ensure that colleagues of any employee with a learning difficulty know how to reassure them and lead them to safety.



Figure 12.29 Stair evacuation chair for people with a disability

12.5.4 Building plans and specifications

Plans and specifications can be used to assist understanding of a fire risk assessment or emergency plan. Even where not needed for this purpose they can help you and your staff keep your fire risk assessment and emergency plan under review and help the fire and rescue service in the event of fire. Any symbols used should be shown on a key. Plans and specifications should include the following:

- ▶ essential structural features such as the layout of function rooms, escape doors, wall partitions, corridors, stairways, etc. (including any fire-resisting

structure and self-closing fire doors provided to protect the escape routes);

- ▶ location of refuges and lifts that have been designated suitable for use by people with a disability and others who may need assistance to escape in case of a fire;
- ▶ methods for fighting fire (details of the number, type and location of the fire-fighting equipment);
- ▶ location of manually operated fire alarm call points and control equipment for fire alarms;
- ▶ location of any control rooms and fire staff posts;
- ▶ location of any emergency lighting equipment and the exit route signs;
- ▶ location of any high-risk areas, equipment or process that must be immediately shut down by staff on hearing the fire alarm;
- ▶ location of any automatic fire-fighting systems, risers and sprinkler control valves;
- ▶ location of the main electrical supply switch, the main water shut-off valve and, where appropriate, the main gas or oil shut-off valves; and
- ▶ plans and specifications relating to all recent constructions.

This information should be passed on to any later users or owners of the premises.

12.6 Further information

The Management of Health and Safety at Work Regulations 1999

The Health and Safety (Safety Signs and Signals) Regulations 1996

Regulatory Reform (Fire Safety) Order 2005

Fire (Scotland) Act 2005

Fire safety (Scotland) Regulations 2006

Controlling fire and explosion risks in the workplace INDG370(rev1) 2013, ISBN 97807176 64856 <http://www.hse.gov.uk/pubns/indg370.htm>

The Dangerous Substances and Explosive Atmospheres Regulations 2002 SI 2002 No 2776, ISBN 9780 11 042957 5

Dangerous substances and explosive atmospheres, L138 2nd Edition 2013. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice, 2003, HSE Books, ISBN 978 0 7176 66164 <http://www.hse.gov.uk/pubns/books/l138.htm>

Fire Risk Assessment – Offices and Shops, DCLG, ISBN 978 1 85112 815 0.

Fire Risk Assessment – Factories and Warehouses, DCLG, ISBN 978 1 85112 816 7.

Fire Risk assessment – Sleeping accommodation, DCLG, ISBN 978 1 85112 817 4

Fire Risk assessment – Residential care premises, DCLG, ISBN 978 1 85112 818 1

Fire Risk assessment – Educational premises, DCLG, ISBN 978 1 85112 819 8

Fire Risk assessment – Small and Medium places of assembly, DCLG, ISBN 978 1 85112 820 4

Fire Risk assessment – Large places of assembly, DCLG, ISBN 978 1 85112 821 1

Fire Risk assessment – Theatres, cinemas and similar places, DCLG, ISBN 978 1 85112 822 8

Fire Risk assessment – Open air events and venues DCGL ISBN 978 1 85112 823 5

Fire Risk assessment – Health care premises, DCLG, ISBN 978 1 85112 824 2

Fire Risk assessment – Transport premises and facilities, DCLG, ISBN 978 1 85112 825 9 <http://www.communities.gov.uk/fire/firesafety/firesafetylaw>

12

12.7 Practice revision questions

1. (a) **Outline** the differences between the three types of enforcement notice which may be issued under the Regulatory Reform (Fire Safety) Order.
- (b) **Identify** the principal fire safety duties of the 'responsible person' as defined by the Regulatory Reform (Fire Safety) Order.
2. (a) **Describe** the three sides of a 'fire triangle'.
- (b) **Outline THREE** methods of extinguishing fires.
- (c) **Identify FOUR** different types of ignition source that may cause a fire to occur, and give a typical workplace example of **EACH** type.
- (d) **Identify FIVE** classes of fire, the associated fuel sources and the appropriate fire extinguisher to use for each class.
3. **Outline THREE** methods of heat transfer (other than direct burning) and **explain** how each can cause the spread of fire in buildings.
4. (a) **Identify SIX** causes of fire in a workplace.
- (b) **Identify** the possible consequences on people of fires in a workplace.
- (c) **Outline** the main control measures to minimise the risk of fire in a workplace.

5. (a) **Identify** the five stages of a fire risk assessment in a workplace.
(b) **Outline** the particular issues that should be considered in the fire risk assessment of temporary workplaces.
(c) **Identify** additional factors to be taken into account during building refurbishment work.
6. **Outline** the contents of a typical fire plan that should be attached to a fire risk assessment.
7. (a) **Outline** effective control measures for the safe storage and handling of small containers containing flammable solvents.
(b) **Identify EIGHT** types of unsatisfactory working practices using flammable gas cylinders that could increase the risk of a fire or explosion.
8. Fire protection is an important feature in the design of a new building.
(a) **Identify SIX** structural measures that can help to prevent the spread of fire and smoke.
(b) **Outline** the issues involved in the fire compartmentation of a building.
9. The failure of electrical equipment is one of the main causes of workplace fires.
(a) **Outline** how fires could be caused by the failure of electrical cables and equipment.
(b) **Identify TWO** types of extinguisher that can be used safely on fires involving electrical equipment and **identify** those extinguishers that should not be used in such fires.
(c) **Outline** suitable control measures that should be taken to minimise the risk of fire from electrical equipment when used in a flammable atmosphere.
10. (a) **Identify TWO** types of emergency warning systems that can be installed in the building to ensure that all occupants can be made aware of the need to evacuate the building.
(b) **Outline** the main factors to be considered in the siting of fire extinguishers.
(c) **Outline** suitable arrangements for the inspection and maintenance of fire extinguishers in the workplace.
11. (a) **Outline ONE** advantage and **ONE** limitation of each of the main types of fire extinguisher.
(b) **Outline TWO** advantages and **TWO** disadvantages of using hose reels as a means of extinguishing fires.
(c) **Identify** the issues associated with the access for fire and rescue services to a workplace.
12. (a) **Outline** the principal requirements for a means of escape from a building in the event of a fire.
(b) **Outline** the role of fire marshals in the event of a fire emergency.
(c) **Outline** reasons that may delay the safe evacuation of occupants from a workplace during a fire.
13. (a) **Identify** the issues to consider for the location of an assembly point for use in a workplace evacuation.
(b) **Outline** the reasons for undertaking regular fire drills in the workplace.
(c) **Outline** the contents of a training programme for employees on the emergency action to take in the event of fire.

APPENDIX 12.1 Fire risk assessment checklist

As recommended in Fire Safety Guides published by the Department for Communities and Local Government in 2006

Checklist

Follow the five key steps – Fill in the checklist – Assess your fire risk and plan fire safety.

1. Fire safety risk assessment

Fire starts when heat (source of ignition) comes into contact with fuel (anything that burns) and oxygen (air).

You need to keep sources of ignition and fuel apart.

How could a fire start?

Think about heaters, lighting, naked flames, electrical equipment, hot processes such as welding or grinding, cigarettes, matches and anything else that gets very hot or causes sparks.

What could burn?

Packaging, rubbish and furniture could all burn just like the more obvious fuels such as petrol, paint, varnish and white spirit. Also think about wood, paper, plastic, rubber and foam. Do the walls or ceilings have hardboard, chipboard or polystyrene? Check outside, too.

Check

▶ Have you found anything that could start a fire?

Make a note of it.

▶ Have you found anything that could burn?

Make a note of it.

2. People at risk

People at risk

Everyone is at risk if there is a fire. Think whether the risk is greater for some because of when or where they work, such as night staff, or because they're not familiar with the premises, such as visitors or customers.

Children, the elderly or disabled people are especially vulnerable.

Check

Have you identified:

▶ who could be at risk?

▶ who could be especially at risk?

Make a note of what you have found.

3. Evaluate and act

Evaluate

First, think about what you have found in Steps 1 and 2: what are the risks of a fire starting, and what are the risks to people in the building and nearby?

Remove and reduce risk

How can you avoid accidental fires? Could a source of heat or sparks fall, be knocked or pushed into something that would burn? Could that happen the other way round?

Protect

Take action to protect your premises and people from fire.

Check

- ▶ Have you assessed the risks of fire in your workplace?
- ▶ Have you assessed the risk to staff and visitors?
- ▶ Have you kept any source of fuel and heat/sparks apart?
- ▶ If someone wanted to start a fire deliberately, is there anything around they could use?
- ▶ Have you removed or secured any fuel an arsonist could use?
- ▶ Have you protected your premises from accidental fire or arson?
- ▶ **How can you make sure everyone is safe in case of fire?**
 - ▷ Will you know there is a fire?
 - ▷ Do you have a plan to warn others?
 - ▷ Who will make sure everyone gets out?
 - ▷ Who will call the fire service?
 - ▷ Could you put out a small fire quickly and stop it spreading?
- ▶ **How will everyone escape?**
 - ▷ Have you planned escape routes?
 - ▷ Have you made sure people will be able to safely find their way out, even at night if necessary?
 - ▷ Does all your safety equipment work?
 - ▷ Will people know what to do and how to use equipment?

Make a note of what you have found.

4. Record, plan and train

Record

Keep a record of any fire hazards and what you have done to reduce or remove them. If your premises are small, a record is a good idea. If you have five or more

staff or have a licence, then you must keep a record of what you have found and what you have done.

Plan

You must have a clear plan of how to prevent fire and how you will keep people safe in case of fire. If you share a building with others, you need to coordinate your plan with them.

Train

You need to make sure your staff know what to do in case of fire, and if necessary, are trained for their roles.

Check

- ▶ Have you made a record of what you have found, and action you have taken?
- ▶ Have you planned what everyone will do if there is a fire?
- ▶ Have you discussed the plan with all staff?
- ▶ **Have you:**
 - ▶ informed and trained people (practised a fire drill and recorded how it went)?
 - ▶ nominated staff to put in place your fire prevention measures, and trained them?
 - ▶ made sure everyone can fulfil their role?

- ▶ informed temporary staff?
- ▶ consulted others who share a building and included them in your plan?

5. Review

Keep your risk assessment under regular review. Over time, the risks may change.

If you identify significant changes in risk or make significant changes to your plan, you must tell those who share the premises and, where appropriate, retrain staff.

Have you:

- ▶ made any changes to the building inside or out?
- ▶ had a fire or near miss?
- ▶ changed work practices?
- ▶ begun to store chemicals or dangerous substances?
- ▶ significantly changed your stock or stock levels?
- ▶ planned your next fire drill?

The checklist above can help you with the fire risk assessment but you may need additional information, especially if you have large or complex premises.

Source: Department for Community and Local Government.

APPENDIX 12.2 Typical fire notice



Chemical and biological health hazards and risk control

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This chapter covers the following NEBOSH learning objectives:

1. Outline the forms of, the classification of, and the health risks from exposure to, hazardous substances
2. Explain the factors to be considered when undertaking an assessment of the health risks from substances commonly encountered in the workplace
3. Explain the use and limitations of occupational exposure limits including the purpose of long-term and short-term exposure limits
4. Outline control measures that should be used to reduce the risk of ill-health from exposure to hazardous substances
5. Outline the hazards, risks and controls associated with specific agents
6. Outline the basic requirements related to the safe handling and storage of waste

13.1 Forms of, classification of, and health risks from hazardous substances

13.1.1 Introduction

Occupational health is as important as occupational safety, but generally receives less attention from managers. Every year twice as many people suffer ill-health that is caused or exacerbated by the workplace than suffer workplace injury. Although these illnesses do not usually kill people, they can lead to many years of discomfort and pain. Such illnesses include respiratory disease, hearing problems, asthmatic conditions and back pain. Furthermore, it has been estimated in the UK that 30% of all cancers probably have an occupational link – that linkage is known for certain in 8% of cancer cases. Occupational exposures to fumes, dusts and chemicals in various forms account for around 4,000 deaths a year and some 38,000 individuals suffer breathing or lung problems possibly caused by their work.

Work in the field of occupational health has been taking place for the last four centuries and possibly longer. The main reason for the relatively low profile for occupational health over the years has been the difficulty in linking the ill-health effect with the workplace cause. Many illnesses, such as asthma or back pain, can have a workplace cause but can also have other causes. Many of the advances in occupational health have been as a result of statistical and epidemiological studies (one well-known such study linked the incidence of lung cancer to cigarette smoking). While such studies are invaluable in the assessment of health risk, there is always an element of doubt when trying to link cause and effect. The measurement of gas and dust concentrations is also subject to doubt when a correlation is made between a measured sample and the workplace environment from which it was taken. Occupational health, unlike occupational safety, is generally more concerned with probabilities than certainties.

In this chapter, chemical and biological health hazards will be considered – other forms of health hazard will be covered in Chapter 14.

The chemical and biological health hazards described in this chapter are covered by the following health and safety regulations:

- ▶ Control of Substances Hazardous to Health Regulations;
- ▶ Control of Lead at Work Regulations;
- ▶ Control of Asbestos at Work Regulations.

Risk assessment is not only concerned with injuries to the workplace but also needs to consider the possibility of occupational ill-health. Health risks fall into the following four categories:

- ▶ chemical (e.g. paint solvents, exhaust fumes);
- ▶ biological (e.g. bacteria, pathogens);
- ▶ physical (e.g. noise, vibrations);
- ▶ psychological (e.g. occupational stress).

13.1.2 Forms of chemical agent

Chemicals can be transported by a variety of agents in a variety of forms. They are normally defined in the following ways.

Dusts are solid particles slightly heavier than air but often suspended in it for a period of time. The size of the particles ranges from about 0.4 mm (fine) to 10 mm (coarse). Dusts are created either by mechanical processes (e.g. grinding or pulverising) or construction processes (e.g. concrete laying, demolition or sanding) or by specific tasks (e.g. furnace ash removal). The fine dust is much more hazardous because it penetrates deep into the lungs and remains there – known as **respirable dust**. In rare cases, respirable dust enters the bloodstream directly causing damage to other organs. Examples of such fine dust are cement, granulated plastic materials and silica dust produced from stone or concrete dust. Repeated exposure may lead to permanent lung disease. Any dusts which are capable of entering the nose and mouth during breathing are known as **inhalable dust**.

Fibres are threads or filaments that can occur naturally (e.g. asbestos) or be man-made such as glass-fibre, nylon and polyester. Man-made fibres are commonly used in insulation boards, blankets for the purpose of heat treatment, electrical insulation and in the reinforcement of plastic and cement. Fibres have a ven

length to width ratio of at least 100 and many fibres are in the respirable range causing concern about the effects of exposure to many fibres – fibrosis of the lung and various cancers. Fibres with diameters in excess of 10 µm can cause irritation of the skin and eyes. Exposure to a large concentration of such fibres may also cause irritation in the upper respiratory tract. Although the hazards and risks of asbestos and glass-fibre have been well documented, there are many other types of fibre in use. These include synthetic and semi-synthetic fibres (e.g. cellulosic fibres), a range of other non-organic fibres and whiskers and specialist technical fibres including various types of carbon fibres and nanofibres.

Vapours are any substances present at a temperature above their boiling point. Steam is the gaseous form of water. Common gases include carbon monoxide, carbon dioxide, nitrogen and oxygen. Gases are absorbed into the bloodstream where they may be beneficial (oxygen) or harmful (carbon monoxide).

Liquids are substances which are at or very close to their boiling temperatures. They are gaseous in form. Many solvents, such as cleaning fluids, fall into this category. The vapours, if inhaled, enter the bloodstream and some can cause short-term effects (dizziness) and long-term effects (brain damage).

Solids are substances which normally exist at a temperature between freezing (solid) and boiling (liquids and gases) points. They are sometimes referred to as fluids in health and safety legislation.

Mists are similar to vapours in that they exist at or near their boiling temperature but are closer to the liquid phase. This means that very small liquid droplets are suspended in the vapour. A mist is produced during the spraying process (such as paint spraying). Many industrially produced mists can be very damaging when inhaled, producing similar effects to vapours. It is possible for some mists to enter the body through the skin or by ingestion with food.

Dusts are a collection of very small metallic particles (less than 1 mm) which have condensed from the gaseous state. They are most commonly generated by the welding process. The particles tend to be within the respirable range (approximately 0.4–1.0 mm) and can lead to long-term permanent lung damage. The exact nature of any harm depends on the metals used in the welding process and the duration of the exposure.

13.1.3 Forms of biological agent

As with chemicals, biological hazards may be transported by any of the following forms of agent.

Fungi are very small organisms, sometimes consisting of a single cell, and can appear as plantlike (e.g. mushrooms and yeast). Unlike plants, they cannot produce their own food but either live on dead organic matter, or on living animals or plants as parasites. Fungi reproduce by producing spores, which can cause

allergic reactions when inhaled. The infections produced by fungi in humans may be mild, such as athlete's foot, or severe, such as ringworm. Many fungal infections can be treated with antibiotics.

Moulds are a particular group of very small fungi which, under damp conditions, will grow on surfaces such as walls, bread, cheese, leather and canvas. They can be beneficial (penicillin) or cause allergic reactions (asthma). Asthma attacks, athlete's foot and farmer's lung are all examples of fungal infections.

Bacteria are very small single-celled organisms which are much smaller than cells within the human body. They can live outside the body and be controlled and destroyed by antibiotic drugs. There is evidence that bacteria are becoming resistant to most antibiotics. This has been caused by the widespread misuse of antibiotics. It is important to note that not all bacteria are harmful to humans. Bacteria aid the digestion of food, and babies would not survive without their aid to break down the milk in their digestive system. Legionellosis, tuberculosis and tetanus are all bacterial diseases.

Viruses are minute, non-cellular organisms which can only reproduce within a host cell. They are very much smaller than bacteria and cannot be controlled by antibiotics. They appear in various shapes and are continually developing new strains. They are usually only defeated by the defence and healing mechanisms of the body. Drugs can be used to relieve the symptoms of a viral attack but cannot cure it. The common cold is a viral infection as are hepatitis, AIDS (HIV) and influenza.

A number of diseases including bovine spongiform encephalopathy (BSE) in cattle and Creutzfeldt–Jakob disease (CJD) in humans are caused by another biological agent known as a prion. A **prion** is an infectious agent that is composed primarily of protein. Such agents induce existing substances, called polypeptides, in the host organism to take on a rogue form. All known prion diseases affect the structure of the brain or other neural tissue, are currently untreatable and are always fatal.

13.1.4 Classification of hazardous substances and their associated health risks

A hazardous substance is one which can cause ill-health to people at work. Such substances may include those used directly in the work processes (glues and paints), those produced by work activities (welding fumes) or those which occur naturally (dust). Hazardous substances are classified according to the severity and type of hazard which they may present to people who may come into contact with them. The contact may occur while working or transporting the substances or might occur during a fire or accidental spillage.

Until 2015, the supply and hazard classification of substances was regulated in the UK by the Chemicals

(Hazard Information and Packaging for Supply) 2009 Regulations (CHIP 4). As with the CLP Regulation, CHIP required suppliers to identify the hazards of the chemicals that they supplied, provide information regarding those hazards and package their products safely. From June 2015 CHIP 4 was revoked and fully superseded by the Classification, Labelling and Packaging of Substances and Mixtures Regulation (EC) (known as CLP).

A hazard pictogram is an image on a label that includes a warning symbol and specific colours intended to provide information about the damage a particular substance or mixture can cause to health or the environment (see Figure 13.1). The CLP Regulation has introduced a new classification and labelling system for hazardous chemicals in the European Union. The pictograms have also changed and are in line with the United Nations Globally Harmonised System (GHS). The new pictograms are in the shape of a red diamond with a white background, and replace the old orange square symbols which applied under CHIP 4. Since 1 December 2010, some substances and mixtures have already been labelled according to the new legislation, but the old pictogram can still be on the market until 1 June 2017. There are several classifications but here only the most common under each classification will be described.

CHIP 4 classifications

Irritant is a non-corrosive substance which can cause skin (dermatitic) or lung (bronchial) inflammation after repeated contact. People who react in this way to a particular substance are **sensitised** or **allergic** to that substance. In most cases, it is likely that the concentration of the irritant may be more significant than the exposure time. Many household substances, such as wood preservatives, bleaches and glues, are irritants. Many chemicals used as solvents are also irritants (white spirit, toluene and acetone). Formaldehyde and ozone are other examples of irritants.

Corrosive substances are ones that may destroy living tissue on contact – usually by burning the skin. Usually strong acids or alkalis, examples include sulphuric acid and caustic soda. Many tough cleaning substances, such as kitchen oven cleaners, are corrosive as are many dishwasher crystals.

Harmful is the most commonly used classification and describes a substance which, if swallowed, inhaled or penetrates the skin, may pose limited health risks. These risks can usually be minimised or removed by following the instruction provided with the substance (e.g. by using personal protective equipment). There are many household substances which fall into this category including bitumen-based paints and paintbrush restorers. Many chemical cleansers are categorised as harmful. It is very common for substances labelled harmful also to be categorised as irritant.

Toxic substances are poisonous and impair the function of one or more organs within the body, such as the kidney, liver and heart. A toxic substance is therefore, a poisonous one. Lead, mercury, cyanide and the gas carbon monoxide are toxic substances. The effect on the health of a person exposed to a toxic substance depends on the concentration and amount of the substance, the frequency of the exposure, the effectiveness of the control measures in place, the state of health and age of the person and the route of entry into the body have influence on the effect of a toxic substance.

Very toxic substances are very hazardous to health when inhaled, swallowed or when they come into contact with the skin and could be fatal. Examples of very toxic substances include prussic acid, nicotine and carbon monoxide.

GHS classifications

The **health hazard** classification combines the old 'harmful' and 'irritant' classifications. Such a substance will be harmful if swallowed, inhaled or contacts skin. It may cause respiratory irritation, drowsiness or dizziness, an allergic skin reaction, a serious eye irritation or skin irritation. It could also be harmful to the environment by destroying ozone in the upper atmosphere. Typical substances include washing detergents, toilet cleaner and coolant fluid.

A **serious health hazard** substance may be fatal if swallowed and/or enters the airways and cause damage to organs. It may damage human fertility or the unborn child and may cause genetic defects. It may also cause allergy or asthma symptoms or breathing difficulties if inhaled or may cause cancer. Turpentine and petrol carry a serious health hazard warning. Serious health hazard is similar to the toxic CHIP 4 classification.

The **corrosive** classification is very similar to the CHIP 4 corrosive classification. A corrosive substance will probably be corrosive to metals and can cause both severe skin burns and eye damage. Strong drain cleaners, acetic acid and hydrochloric acid are all examples of corrosive substances.

Acute toxicity is similar to the very toxic CHIP 4 classification. Such a substance will always be toxic if it can also be fatal if swallowed, inhaled or comes into contact with the skin. Biocides, methanol and many pesticides can be acutely toxic.

Other types of hazardous substances

Carcinogenic substances are ones which are known for, or suspected of, promoting abnormal development of body cells to become cancers. Asbestos, hardwood dust, creosote and some mineral oils are carcinogenic. It is very important that the health and safety rules accompanying the substance are strictly followed.

Mutagenic substances are those which damage genetic material within cells, causing abnormal changes that can be passed from one generation to another.

Reproductive toxin is a chemical which affects adversely the reproductive process including mutations and other effects on the unborn child. One group of such toxins are teratogens that can cause congenital abnormalities, which are also called birth defects.

Each of the classifications may be identified by a symbol and a symbolic letter – the most common of these are shown in Figure 13.1, which shows the relationship between the CHIP 4 and GHS classifications but also note that these are changing to the new Global Harmonisation Scheme (GHS).

The effects on health of hazardous substances may be either acute or chronic.

Acute effects are of short duration and appear fairly rapidly, usually during or after a single or short-term exposure to a hazardous substance. Such effects may be severe and require hospital treatment but are usually reversible. Examples include asthma-type attacks, nausea and fainting.

Chronic effects develop over a period of time which may extend to many years. The word 'chronic' means

'with time' and should not be confused with 'severe' as its use in everyday speech often implies. Chronic health effects are produced from prolonged or repeated exposures to hazardous substances resulting in a gradual, latent and often irreversible illness, which may remain undiagnosed for many years. Many cancers and mental diseases fall into the chronic category. During the development stage of a chronic disease, the individual may experience no symptoms.

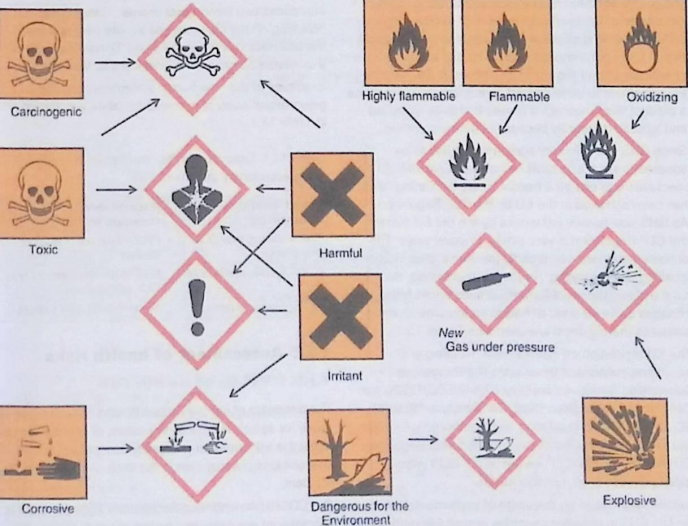
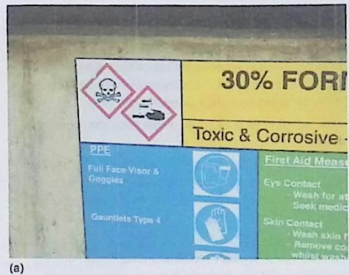


Figure 13.1 (a) GHS symbols in use and (b) How the existing European packaging symbols relate to the new GHS symbols adopted under the CLP EU Regulation

13.1.5 Hazard warnings and precautionary statements

The European Regulation on classification, labelling and packaging of substances and mixtures became law across the EU in 2009 and is known as either the CLP Regulation or simply as 'CLP'. It adopted the United Nations Globally Harmonised System on the classification and labelling of chemicals (GHS) across all EU states.

Worldwide, there are many different laws to identify hazardous chemicals (classification) and to communicate this information to users. This is often confusing as the same chemical can have different hazard descriptions in different countries. The UN brought together experts from different countries to create the GHS.

The aim of GHS is to have, throughout the world, the same:

- ▶ criteria for classifying chemicals according to their health, environmental and physical hazards;
- ▶ hazard communication requirements for labelling and safety data sheets.

GHS provides a basis for globally uniform physical, environmental, health and safety information on hazardous chemicals through the harmonisation of the criteria for their classification and labelling. It was developed at UN level with the aim of overcoming differing labelling information requirements on physical, health and environmental hazards for the same chemicals around the world. Moreover, it also aims to lower barriers to trade caused by the fact that every time a product was exported, it mostly had to be classified and labelled differently because of differing criteria.

Since GHS is a voluntary agreement, it has to be adopted through a suitable national or regional legal mechanism to ensure it becomes legally binding. This has been achieved in the EU by the CLP Regulation. As GHS was heavily influenced by the old EU system, the CLP Regulation is very similar in many ways. The duties on suppliers are broadly the same: classification, labelling and packaging. As already mentioned, the rules for the classification of hazardous substances have changed and a new set of hazard pictograms (quite similar to the old ones) are used (see Figure 13.1). The EU legislation on classification, labelling and packaging consists of three acts: The Dangerous Substances Directive (Directive 67/548/EEC, DSD), the Dangerous Preparations Directive (Directive 1999/45/EC, DPD) and the Regulation on Classification, Labelling and Packaging of Substances and Mixtures, Regulation (EC) No 1272/2008 (CLP Regulation or CLP) which applies directly in all member states.

Further information on the stage of implementation of the UN GHS in different countries is available on the UNECE website, see: http://unece.org/trans/danger/publi/ghs/implementation_e.html.

Under the CLP Regulation there are:

- ▶ new scientific criteria to assess hazardous chemicals;
- ▶ two new harmonised hazard warning symbols (known as 'pictograms');
- ▶ a new design for existing symbols;
- ▶ new harmonised **hazard warning (H)** and **precautionary statements (P)** for labels and
- ▶ two new signal words – 'Danger' and 'Warning'.

A **hazard statement** is a phrase that describes the nature of the hazard in the substance or mixture. The hazard statement will be determined by the application of the classification criteria. It replaces the 'risk R-phrase' used previously. A list of some of the statements given in Appendix 13.1.

A **precautionary statement** is a phrase that describes recommended measure(s) to minimise or prevent adverse effects resulting from exposure to a hazardous substance or mixture due to its use or disposal. Suppliers determine the appropriate precautionary statements (usually no more than six) based on the required hazard statements. It replaces the 'safety S-phrase' used previously.

As mentioned above, the CLP Regulation also introduces two new **signal words**: 'Danger' and 'Warning'. If the chemical has a more severe hazard, the label includes the signal word 'Danger'; in case of less severe hazards, the signal word is 'Warning'.

Examples of the new hazard statements and the new precautionary statements for labels are shown in Table 13.1.

Table 13.1 Examples of the new hazard warning (H) and precautionary statements (P)

Hazard warning statement (H)	Precautionary statement (P)
H240 – Heating may cause an explosion	P102 – Keep out of reach of children
H320 – Causes eye irritation	P271 – Use only outdoors or in well-ventilated area
H401 – Toxic to aquatic life	P410 – Protect from sunlight

13.2 Assessment of health risks

13.2.1 Types of health risk

The principles of control for health risks are the same as those for safety. However, the nature of health risks makes the link between work activities and employee ill-health less obvious than in the case of injury from an accident.

The COSHH Amendment Regulations 2004 set out the principles of good practice for the control of exposure. Figure 13.3 shows a route map for achieving adequate control.

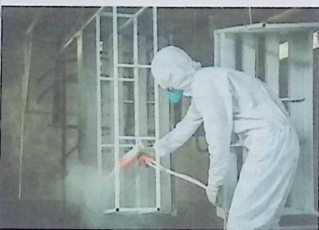


Figure 13.2 Paint spraying – risk of sensitising particularly if isocyanate based paint used and inadequate local exhaust ventilation

Unlike safety risks, which can lead to immediate injury, the result of daily exposure to health risks may not manifest itself for months, years and, in some cases, decades. Irreversible health damage may occur before any symptoms are apparent. It is, therefore, essential to develop a preventative strategy to identify and control risks before anyone is exposed to them.

Risks to health from work activities include:

- ▶ skin contact with irritant substances, leading to dermatitis, etc.;
- ▶ inhalation of respiratory sensitisers, triggering immune responses such as asthma;
- ▶ badly designed workstations requiring awkward body postures or repetitive movements, resulting

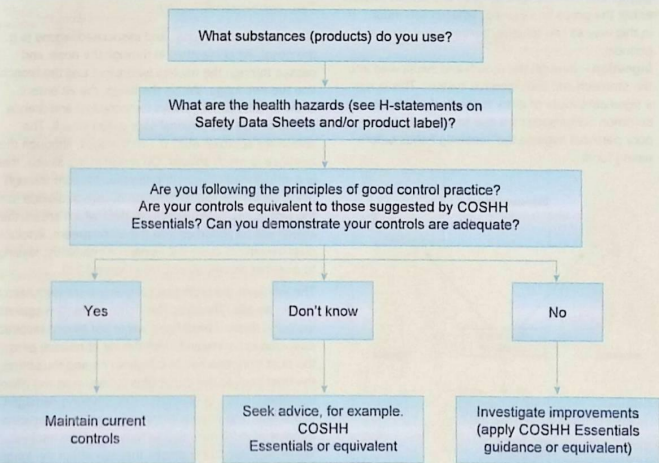


Figure 13.3 Route map for adequate control for SMEs non-experts (Source HSE)

in upper limb disorders, repetitive strain injury and other musculoskeletal conditions;
 noise levels which are too high, causing deafness and conditions such as tinnitus;
 too much vibration, for example from hand-held tools leading to hand-arm vibration syndrome and circulatory problems;
 exposure to ionising and non-ionising radiation including ultraviolet in the sun's rays, causing burns, sickness and skin cancer;
 infections ranging from minor sickness to life-threatening conditions, caused by inhaling

or being contaminated with microbiological organisms;
 ▶ stress causing mental and physical disorders.

Some illnesses or conditions, such as asthma and back pain, have both occupational and non-occupational causes and it may be difficult to establish a definite causal link with a person's work activity or their exposure to particular agents or substances. But, if there is evidence that shows the illness or condition is prevalent among the type of workers to which the person belongs or among workers exposed to similar agents or substances,

it is likely that their work and exposure has contributed in some way.

13.2.2 Routes of entry of hazardous substances into the body

There are three principal routes of entry of hazardous substances into the human body:

- ▶ **inhalation** – breathing in the substance with normal air intake. This is the main route of contaminants into the body. These contaminants may be chemical (e.g. solvents or welding fume) or biological (e.g. bacteria or fungi) and become airborne by a variety of modes, such as sweeping, spraying, grinding and bagging. They enter the lungs where they have access to the bloodstream and many other organs;
- ▶ **absorption through the skin** – the substance comes into contact with the skin and enters through either the pores or a wound. Tetanus can enter in this way as can toluene, benzene and various phenols;
- ▶ **ingestion** – through the mouth and swallowed into the stomach and the digestive system. This is not a significant route of entry to the body. The most common occurrences are due to airborne dust or poor personal hygiene (not washing hands before eating food).

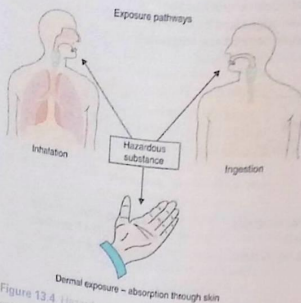


Figure 13.4 Hazardous substances – principal routes of entry into the human body.

Another very rare entry route is by **injection** or **skin puncture**. The abuse of compressed air lines by shooting high pressure air at the skin can lead to air bubbles entering the bloodstream. Accidents involving hypodermic syringes in a health or veterinary service setting are rare but illustrate this form of entry route. Body cells have a natural defence system against illness caused by harmful invasive foreign particles and bacteria. White blood cells, known as phagocytes,

give protection by destroying these harmful particles, bacteria and dead cells. This is basically a scavenging action at the level of the defence mechanisms include the secretion of antibodies, the prevention of excessive cell division, the repair of damaged tissue.

The most effective control measures will be to reduce the risk of infection from biological agents. These are disinfection, proper disposal of clinical waste (including syringes), good personal hygiene and appropriate, personal protective equipment. Other control measures include vermin control, water treatment and immunisation.

There are five major functional systems in the human body – respiratory, nervous, cardiovascular (blood), urinary and the skin.

The respiratory system

This comprises the lungs and associated organs (the nose). Air is breathed in through the nose and passes through the trachea (windpipe) and then into the two lungs. Within the lungs, the air enters many smaller passageways (bronchioles) and then into one of 300,000 terminal sacs called alveoli. The alveoli are approximately 0.1 mm across, although the entrance is much smaller. On arrival in the alveoli is a diffusion of oxygen into the bloodstream through the blood capillaries and an effusion of carbon dioxide from the bloodstream. While soluble dust which enters the alveoli will be absorbed into the bloodstream, insoluble dust (respirable dust) will remain permanently, leading to possible chronic illness (see Figure 13.5).

The whole of the bronchial system is lined with hair known as cilia. The cilia offer some protection against insoluble dusts. These hairs will arrest all non-respirable dust (above 5 mm) and, with the aid of mucus, push the dust from one hair to a higher one and thus prevent the dust back to the throat (this is known as the ciliary escalator). It has been shown that smoking damages this action. The nose will normally trap large particles (greater than 20 mm) before they enter the trachea. There are over 40 conditions that can affect the lungs and/or airways and impinge on the ability of a person to breathe normally.

Respirable dust tends to be long thin particles with sharp edges which puncture the alveoli walls. The puncture heals producing scar tissues which are less flexible than the original walls – this can lead to fibrosis. Such dusts include asbestos, coal, silica, some plastics and talc. The possible indicators of a dust problem in the workplace are fine deposits on surfaces, people coughing or products or blocked filters on extraction equipment. Health reports or complaints from the workforce could also indicate a dust problem.

Acute effects on the respiratory system include bronchitis and asthma and chronic effects include

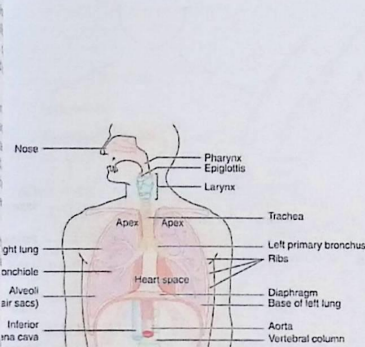


Figure 13.5 The upper and lower respiratory system

osis and cancer. Hardwood dust, for example, can produce asthma attacks and nasal cancer.

inally, asphyxiation, due to a lack of oxygen, is a problem in confined spaces particularly when MIG (metal inert gas) welding is taking place.

The nervous system

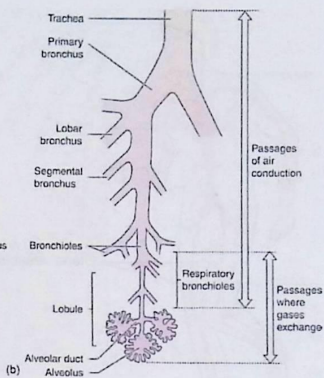
The nervous system consists primarily of the brain, the spinal cord and nerves extending throughout the body. Any muscle movement or sensation (e.g. hot and cold) is controlled or sensed by the brain through small electrical impulses transmitted through the spinal cord and nervous system.

The effectiveness of the nervous system can be reduced by **neurotoxins** and lead to changes in mental ability (loss of memory and anxiety), epilepsy and narcosis (dizziness and loss of consciousness). Organic solvents (trichloroethylene) and heavy metals (mercury) are well-known neurotoxins. The expression 'mad hatters' originated from the mental deterioration of top hat polishers in the 19th century who used mercury to produce a shiny finish on the top hats.

The cardiovascular system

The blood system uses the heart to pump blood around the body through arteries, veins and capillaries. Blood is produced in the bone marrow and consists of a plasma within which are red cells, white cells and platelets. The system has three basic objectives:

- to transport oxygen to vital organs, tissues and the brain and carbon dioxide back to the lungs (red cell function);



(b)

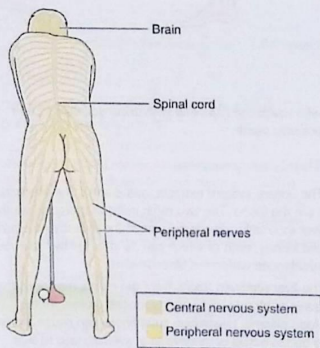


Figure 13.6 The nervous system

- ▶ to attack foreign organisms and build up a defence system (white cell function);
- ▶ to aid the healing of damaged tissue and prevent excessive bleeding by clotting (platelets).

There are several ways in which hazardous substances can interfere with the cardiovascular system. Benzene can affect the bone marrow by reducing the number of blood cells produced. Carbon monoxide prevents the red cells from absorbing sufficient oxygen and the effects depend on its concentration. Symptoms begin

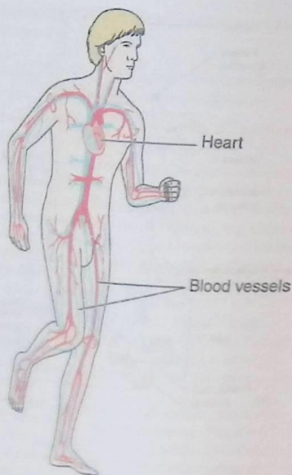


Figure 13.7 The circulatory system

with headaches and end with unconsciousness and possibly death.

The urinary system

The urinary system extracts waste and other products from the blood. The most important organs are the two bean-shaped kidneys, part of the digestive system's waste removal system. It can be affected by hazardous substances when the blood stream:

...carries substances that can be toxic, maintains the fluid balance of the body and provides protein for the blood plasma. Chemical substances can cause the first two problems, and infections, viruses, and toxic substances can cause the second. Death of liver cells can also occur.

...carries substances that are toxic to the kidneys as they filter out waste from the blood. Alcohol in the blood can be toxic to the kidneys. Making red blood cells, which is done in the kidneys, can be affected by drugs. Some drugs can damage the kidneys if they are used in a large amount or for a long time.

Health risks

The kidneys filter out waste from the blood. If they are damaged, waste can build up in the blood and cause health problems. A common cause of kidney damage is a long-term infection. Some drugs can also damage the kidneys.

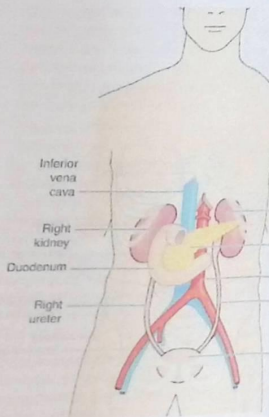


Figure 13.8 Parts of the urinary system

emergency food store (in the form of fat) and help conserve water. There are two layers – an outer layer called the epidermis (0.2 mm) and an inner layer called the dermis (4 mm). The epidermis is a tough protective layer and the dermis contains the sweat glands, nerve endings and hairs.

The most common industrial disease of the skin is **dermatitis** (non-infective dermatitis). It begins with a mild irritation on the skin and develops into blisters which can peel and weep becoming septic. It can be caused by various chemicals, mineral oils and solvents. There are two types:

- ▶ **irritant contact dermatitis** – occurs soon after contact with the substance and the condition reverses after contact ceases (detergents and acids)
- ▶ **allergic contact dermatitis** – caused by a skin sensitiser such as turpentine, epoxy resin, solder flux and formaldehyde that exerts its effects via the immune system. Once sensitised to a substance, a severe dermatitis may occur following a small exposure to this same substance at a later date.

Dermatitis is on the rise and is costing employers more than £20 million a year, even though it's easy to control. Measures to prevent the disease is minimal. Workers in the hotel and catering industry are particularly vulnerable to this debilitating disease as are print workers who have contracted dermatitis after coming into contact with UV curable

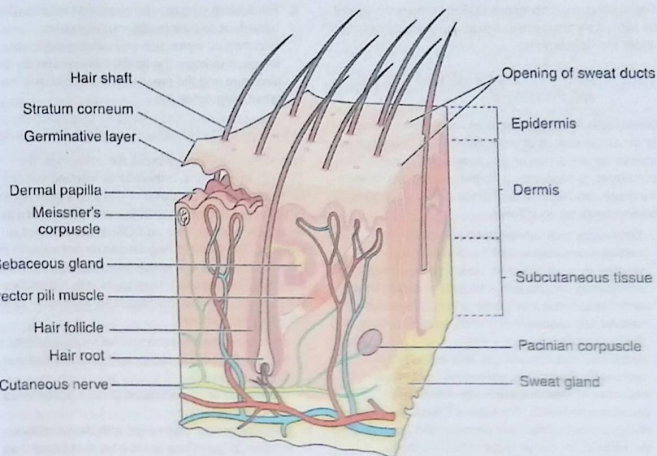


Figure 13.9 The skin – main structures of the dermis

... used to produce a glossy finish to magazine covers.

For many years, dermatitis was seen as a 'nervous' disease which was psychological in nature. Nowadays, it is recognised as an industrial disease which can be controlled by good personal hygiene, personal protective equipment, use of barrier creams and health screening of employees. Dermatitis can appear anywhere on the body but it is normally found on the hands. Therefore, gloves should always be worn when there is a risk of dermatitis.

The risk of dermatitis occurring increases with the presence of cuts or abrasions on the skin, which allow chemicals to be more easily absorbed. The risk also depends on the type, sensitivity and existing condition of the skin.

13.2.3 The role of COSHH

The Control of Substances Hazardous to Health Regulations (COSHH) 1988 were the most comprehensive and significant piece of health and safety legislation to be introduced since the Health and Safety at Work Act 1974. They were enlarged to cover biological agents in 1994 and further amended in 1995, 1999, 2002 and 2004. A detailed summary of these Regulations appears in Chapter 18. The Regulations impose duties on employers to protect employees and others who may be exposed to substances hazardous

to their health and requires employers to control exposure to such substances.

The COSHH Regulations offer a framework for employers to build a management system to assess health risks and to implement and monitor effective controls. Adherence to these Regulations will provide the following benefits to the employee/employer:

- ▶ Improved productivity due to lower levels of health and more effective use of materials.
- ▶ Improved employee morale.
- ▶ Lower numbers of lost working days.
- ▶ Better understanding of health and safety requirements.

The Approved Code of Practice (ACOP) to the COSHH Regulations (COSHH) covers all substances to which the Regulations apply. It outlines the minimum recommended methods that can be used to comply with the Regulations and the accompanying product also provides advice on achieving compliance, such as the control of carcinogenic substances, dust, opening operations, working practices, control measures and reducing health hazards. The latest edition of the ACOP and guidance memorandum of regulatory changes following the introduction of the EU Regulations for Risk of Regulation, Hazard, Authorisation and restriction of Chemicals and CLP classification, labelling and packaging of substances and mixtures.

Organisations which ignore COSHH requirements will be liable for enforcement action, including prosecution, under the Regulations.

13.2.4 Requirements of the COSHH Regulations

When hazardous substances are considered for use (or in use) at a place of work, the COSHH Regulations impose certain duties on employers and require employees to cooperate with the employer by following any measures taken to fulfil those duties. The principal requirements are as follows.

1. Employers must undertake a suitable and sufficient assessment of the health risks created by work which is liable to expose their employees to substances hazardous to health and of the steps that need to be taken by employers to meet the requirements of these Regulations (Regulation 6).
2. Employers must prevent, or where this is not reasonably practicable, adequately control the exposure of their employees to substances hazardous to health. Workspace Exposure Limits (WELs), which should not be exceeded, are specified by the HSE for certain substances. As far as inhalation is concerned, control should be achieved by means other than personal protective equipment. If, however, respiratory protective equipment, for example, is used, then the equipment must conform to HSE standards (Regulation 7). The control of exposure can only be treated as adequate if the principles of good practice (discussed under 13.4.1) are applied (Schedule 2A).
3. Employers and employees must make proper use of any control measures provided (Regulation 8).
4. Employers must maintain any installed control measures on a regular basis, keep suitable records (Regulation 9) and review systems of work.
5. Monitoring must be undertaken of any employee exposed to items listed in Schedule 5 of the Regulations or in any other case where monitoring is required for the maintenance of adequate control or the protection of employees. Records of this monitoring must be kept for at least 5 years, or 40 years where employees can be identified (Regulation 10).
6. Health surveillance must be provided to any employees who are exposed to any substances listed in Schedule 6. Records of such surveillance must be kept for at least 40 years after the last entry (Regulation 11).
7. Emergency plans and procedures must be prepared to deal with accidents or incidents involving exposure to hazardous substances beyond normal day-to-day risks. This will involve warnings and communication systems to give appropriate response immediately after any incident occurs.

8. Employees who may be exposed to substances hazardous to their health must be given information, instruction and training sufficient for them to know the health risks created by exposure and the precautions which should be taken (Regulation 12).

13.2.5 Details of a COSHH assessment

Not all hazardous substances are covered by the COSHH Regulations. If there is no warning symbol on the substance container or it is a biological agent which is not directly used in the workplace (such as an influenza virus), then no COSHH assessment is required. The COSHH Regulations do not apply to hazardous substances which are subject to their own individual Regulations (asbestos, lead or radioactive substances). The COSHH Regulations do apply to the following substances:

- ▶ substances having occupational exposure limits listed in the HSE publication EH40 (Occupational Exposure Limits);
- ▶ substances or combinations of substances listed in the CLP Regulations;
- ▶ biological agents connected with the workplace;
- ▶ substantial quantities of airborne dust (more than 10 mg/m³ of total inhalable dust or 4 mg/m³ of respirable dust, both 8-hour time-weighted averages (TWA), when there is no indication of a lower value);
- ▶ any substance creating a comparable hazard where for technical reasons may not be documented.

The following factors should be considered when assessing health risks:

- ▶ the health risk assessment should be suitable and sufficient (see Chapter 4);
- ▶ the exposure of employees to hazardous substances is adequately controlled;
- ▶ the control measures provided are properly used;
- ▶ the control measures and any associated equipment are properly maintained;
- ▶ monitor employees exposed to hazardous substances;
- ▶ there is adequate health surveillance; and
- ▶ information, instruction and training.

A COSHH assessment is very similar to a risk assessment but is applied specifically to hazardous substances. The HSE has suggested five steps to COSHH assessments but within these steps there are a number of sub-sections. The steps are as follows.

Step 1

Gather information about the substances, the work and working practices. Assessors should:

- ▶ identify the hazardous substances present or likely to be present in the workplace, the categories and numbers of persons (e.g. employees and visitors).

- ▶ gather information about the hazardous substances including the quantity of the substances used;
- ▶ identify the hazards from these substances by reviewing labels, material safety data sheets, HSE guidance and published literature;
- ▶ decide who could be affected by the hazardous substances and the possible routes of entry to people exposed (i.e. inhalation, ingestion or absorption). There is a need to look at both the substances and the activities where people could be exposed to hazardous substances.

Step 2

Evaluate the risks to health either individually or collectively. Assessors should:

- ▶ evaluate the risks to health including the duration and frequency of the exposure of those persons to the substances;
- ▶ evaluate the level of exposure, for example the concentration and length of exposure to any airborne dusts, gases, fumes or vapours;
- ▶ consider any WELs (see 13.3);
- ▶ decide if existing and potential exposure presents any insignificant risks to health or they pose a significant risk to health.

Step 3

Decide what needs to be done to control the exposure to hazardous substances. Assessors should:

- ▶ evaluate the existing control measures, including any PPE and respiratory protective equipment (RPE), for their effectiveness (using any available records of environmental monitoring) and compliance with relevant legislation;
- ▶ decide on additional control measures, if any are required (see 13.4);
- ▶ decide what maintenance and supervision of the use of the control measures are needed;
- ▶ plan what to do in an emergency;
- ▶ set out how exposure should be monitored;
- ▶ decide what, if any, health surveillance is necessary;
- ▶ decide what information, instruction and training is required.

Step 4

Record the assessment. Assessors should:

- ▶ decide if a record is required (five or more employed, and significant findings);
- ▶ decide on the format of the record;
- ▶ decide on storage and how to make records available to employees, safety representatives, etc.

Step 5

Review the assessment. Assessors should:

- ▶ decide when a review is necessary (e.g. changes in substances used, processes or people exposed);
- ▶ decide what needs to be reviewed.

An example of a typical form that can be used for a COSHH assessment is given in Chapter 19.

It is important that the assessment is conducted by somebody who is competent to undertake it. Such competence will require some training, the extent of which will depend on the complexities of the workplace. For large organisations with many high-risk operations, a team of competent assessors will be needed. If the assessment is simple and easily repeated, a written record is not necessary. In other cases, a concise and dated record of the assessment together with recommended control measures should be made available to all those likely to be affected by the hazardous substances. The assessment should be reviewed on a regular basis, particularly when there are changes in work process or substances or when adverse ill-health is reported.

13.2.6 Assessing exposure and health surveillance

Some aspects of health exposure will need input from specialist or professional advisers, such as occupational health hygienists, nurses and doctors. However, considerable progress can be made by taking straightforward measures such as:

- ▶ consulting the workforce on the design of workplaces;
- ▶ talking to manufacturers and suppliers of substances and work equipment about minimising exposure;
- ▶ enclosing machinery to cut down dust, fumes and noise;
- ▶ researching the use of less hazardous substances;
- ▶ ensuring that employees are given appropriate information and are trained in the safe handling of all the substances and materials to which they may be exposed.

To assess health risks and to make sure that control measures are working properly, it may be necessary, for example, to measure the concentration of substances in the air to make sure that exposures remain within the assigned WELs. Sometimes health surveillance of workers who may be exposed will be needed. This will enable data to be collected to check control measures and for early detection of any adverse changes to health. Health surveillance procedures available include biological monitoring for bodily uptake of substances, examination for symptoms and medical surveillance – which may entail clinical examinations and physiological or psychological measurements by occupationally qualified registered medical practitioners. The procedure chosen should be suitable for the case concerned. Sometimes a method of surveillance is

specified for a particular substance, for example, in the COSHH ACoP. Whenever surveillance is undertaken, a health record has to be kept for the person concerned.

Health surveillance should be supervised by a registered medical practitioner or, where appropriate, it should be done by a suitably qualified person (e.g. an occupational nurse). In the case of inspections for easily detectable symptoms like chrome ulceration or early signs of dermatitis, health surveillance should be done by a suitably trained responsible person. If workers could be exposed to substances listed in Schedule 6 of the COSHH Regulations, medical surveillance, under the supervision of an HSE employment medical adviser or a doctor appointed by the HSE, is required. There is more on health surveillance later in this chapter.

13.2.7 Sources of information

There are other important sources of information available for a COSHH assessment in addition to the HSE Guidance Note EH40.


Product labels include details of the hazards associated with the substances contained in the product and any precautions recommended. They may also bear one or more of the CHIP hazard classification symbols.

Material safety data sheets are another very useful source of information for hazard identification and associated advice. Manufacturers of hazardous substances are obliged to supply such sheets to users, giving details of the name, chemical composition and properties of the substance. Information on the nature of the health hazards and any relevant exposure standard (WEL) should also be given together with recommended exposure control measures and personal protective equipment. The sheets contain useful additional information on first-aid and fire-fighting measures and handling, storage, transport and disposal information. The data sheets should be stored in a readily accessible and known place for use in the event of an emergency, such as an accidental release.



(a)

Product J
(abc chemical)



Danger
Fatal if swallowed
Causes skin irritation

Precautions:
Wear protective gloves.
Take off contaminated clothing and wash before reuse.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.

Store locked up.
Dispose of contents/containers in accordance with local regulations.

IF ON SKIN: Rinse skin with water/shower.
IF IN EYES: Rinse cautiously with water.
IF SWALLOWED: Immediately call a Poison Center or doctor/physician. Do not induce vomiting.

ABC Chemical Co., 123 Anywhere St., (123) 456-789
See the SDS for more information

(b)

Figure 13.10 (a) Typical symbols and (b) product labels on containers

Other sources of information include trade association publications, industrial codes of practice and special reference manuals.

13.2.8 Survey techniques for health risks

An essential part of the COSHH assessment is the measurement of the quantity of the hazardous substance in the atmosphere surrounding the workplace. This is known as air sampling. There are two common types of air-sampling technique used for the measurement of air quality:

1. **Stain tube detectors** use direct reading glass indicator tubes filled with chemical crystals which change colour when a particular hazardous substance passes through them. The method of operation is very similar to the breathalyser used by the police to check alcohol levels in motorists. The glass tube is opened at each end and fitted into a pumping device (either hand or electrically operated). A specific quantity of contaminated air containing hazardous substance is drawn through the tube and the crystals in the tube change colour in the direction of the air flow. The tube is calibrated such that the extent of the colour change along the tube indicates the concentration of the hazardous substance within the air sample.

This method can only be effective if there are no leakages within the instrument and the correct volume of sampled air is used. The instrument should be held within 30 cm of the nose of the person whose atmosphere is being tested. A large range of different tubes is available. This technique of sampling is known as **grab** or **spot sampling** since it is taken at one point.

The advantages of the technique are that it is quick, relatively simple to use and inexpensive. There are, however, several disadvantages:

- ▶ The instrument cannot be used to measure concentrations of dust or fume.
- ▶ The accuracy of the reading is approximately 25%; it will yield a false reading if other contaminants present react with the crystals.
- ▶ The instrument can only give an instantaneous reading, not an average reading over the working period (TWA).
- ▶ The tubes are very fragile with a limited shelf life.
- ▶ Some disposal issues.

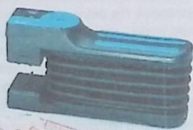


Figure 13.11 Hand pump and stain detector

Passive sampling is measured over a full working period by the worker wearing a badge containing absorbent material. The material will absorb the contaminant gas and, at the end of the measuring period, the sample is sent to a laboratory for analysis. The advantages of this method over the stain tube are that there is less possibility of instrument errors and it gives a TWA reading.

Sampling pumps and heads can be used to measure gases and dusts. The worker, whose breathing zone is being monitored, wears a collection head as a badge and a battery-operated pump on his/her back at waist level. The pump draws air continuously through a filter, fitted in the head, which will either absorb the contaminant gas or trap hazardous dust particles. If this filter is used for dust measurement, it is sometimes called a static dust sampler. Before sampling takes place,

the filter is weighed and the pump flow rate preset. After the designated testing period, it is sent to a specialist laboratory for analysis. The quantity of dust present would be determined either by measuring the weight change of the filter or by chemical analysis (e.g. for lead) or by using microscopes to count the number of fibres (e.g. for asbestos). This system is more accurate than stain tubes and gives a TWA result but can be uncomfortable to wear over long periods. Such equipment can only be used by trained personnel.

4. **Direct reading instruments** are available in the form of sophisticated analysers which can only be used by trained and experienced operatives. Infrared gas analysers are the most common but other types of analysers are also available. They are very accurate and give continuous or TWA readings. They tend to be very expensive and are normally hired or used by specialist consultants.

Other common monitoring instruments include **vane anemometers**, used for measuring air flow speeds, and **hygrometers**, which are used for measuring air humidity.

Qualitative monitoring techniques include smoke tubes and the dust observation lamp. **Smoke tubes** generate a white smoke which may be used to indicate the direction of flow of air – this is particularly useful when the air speed is very low or when testing the effectiveness of ventilation ducting. A **dust observation lamp** enables dust particles which are normally invisible to the human eye to be observed in the light beam. This dust is usually in the respirable range and, although the lamp does not enable any measurements of the dust to be made, it will illustrate the operation of a ventilation system and the presence of such dust.

Regulation 10 requires routine sampling or monitoring of exposure where there could be serious health effects if the controls fail, exposure limits might be exceeded or the control measures may not be working properly. Air monitoring should also be undertaken for any hazardous substances listed in Schedule 5 of the COSHH Regulations. Records of this monitoring should be kept for 5 years unless an employee is identifiable in the records, in which case they should be kept for 40 years.

13.3 Occupational exposure limits

An Occupational Exposure Limit (OEL) or Workplace Exposure limit (WEL) is the acceptable upper limit on the concentration of a hazardous substance in the air within a workplace for a particular or a group of hazardous substances. OELs are normally established by competent national authorities and enforced by appropriate legislation.

One of the main purposes of a COSHH assessment is to adequately control the exposure of employees and others to hazardous substances. This means that

such substances should be reduced to levels which do not pose a health threat to those exposed to them day after day at work. Under the 2004 amendments to the COSHH Regulations 2002, the HSE has assigned WELs (as its OEL) to a large number of hazardous substances and publishes any updates in a publication called 'Workplace Exposure limits' EH40. The WEL is related to the concentration of airborne hazardous substances that people breathe over a specified period of time – known as 'time-weighted average'. Before the introduction of WELs, there were two types of exposure limit published: the maximum exposure limit (MEL) and the occupational exposure standard (OES). Under the amended COSHH the OES/MEL system was replaced with a single WEL. This removed the concern of the HSE that the OES was seen as a 'safe' limit rather than a 'likely safe' limit. Hence, the WEL must not be exceeded. Hazardous substances which have been assigned a WEL fall into two groups.

1. Substances which are carcinogenic or mutagenic or could cause occupational asthma (or listed in section C of the HSE publication 'Asthmagen? Critical assessment for the agents implicated in occupational asthma' as updated from time to time) or are listed in Schedule 1 of the COSHH Regulations. These are substances which were assigned a MEL before 2005. The level of exposure to these substances should be reduced as far as is reasonably practicable.
2. All other hazardous substances which have been assigned a WEL. Exposure to these substances by inhalation must be controlled adequately to ensure that the WEL is not exceeded. These substances were previously assigned an OES before 2005. For these substances, employers should achieve adequate control of exposure by inhalation by applying the principles of good practice outlined in the ACoP and listed in Section 13.4.1. The implication of these principles is discussed later in this chapter.

The WELs are subject to time-weighted averaging. There are two such time-weighted averages (TWA): the long-term exposure limit (LTEL) or 8-hour reference period and the short-term exposure limit (STEL) or 15-minute reference period. The 8-hour TWA is the maximum exposure allowed over an 8-hour period so that if the exposure period was less than 8 hours the WEL is increased accordingly with the proviso that exposure above the LTEL value continues for no longer than 1 hour. Table 13.2 shows some typical WELs for various hazardous substances.

For example, if a person was exposed to a hazardous substance with a WEL of 100 mg/m³ (8-hour TWA) for 4 hours, no action would be required until an exposure level of 200 mg/m³ was reached (further exposure at levels between 100 and 200 mg/m³ should be restricted to 1 hour).

Table 13.2 Examples of workplace exposure limits (WELs)

Group 1 WELs	LTEL (8 h TWA)	STEL
All isocyanates	0.02 mg/m ³	0.07
Styrene	430 mg/m ³	1.0
Group 2 WELs		
Ammonia	18 mg/m ³	25
Toluene	191 mg/m ³	574

if, however, the substance has an STEL of 150 mg/m³ then action would be required when the exposure rose above 150 mg/m³ for more than 15 minutes.

The STEL always takes precedence over the LTEL. When a STEL is not given, it should be assumed to be three times the LTEL value.

The publication EH40 is a valuable document for the health and safety professional as it contains much additional advice on hazardous substances for use during the assessment of health risks, particularly where new medical information has been made available. The HSE is constantly revising WELs and introducing new ones and it is important to refer to the latest publication of EH40.

It is important to stress that if a WEL from Group 1 is exceeded, the process and use of the substance should cease immediately and employees should be removed from the immediate area until it can be made safe. In the longer term the process and the control monitoring measures should be reviewed and health surveillance of the affected employees considered.

The overriding requirement for any hazardous substance which has a WEL from Group 1, is to reduce exposure to as low as is reasonably practicable.

Finally, there are certain limitations on the use of the published WELs:

- ▶ They are specifically quoted for an 8-hour period; an additional STEL for many hazardous substances. Adjustments must be made when exposure occurs over a continuous period longer than 8 hours.
- ▶ They can only be used for exposure in a workplace and not to evaluate or control non-occupational exposure (e.g. to evaluate exposure levels in a neighbourhood close to the workplace, such as a playground).
- ▶ WELs are only approved where the atmospheric pressure varies from 900 to 1100 millibars. This could exclude their use in mining and tunnelling operations.
- ▶ They should also not be used when there is a rapid build-up of a hazardous substance due to a serious accident or other emergency. Emergency arrangements should cover these eventualities.

The fact that a substance has not been allocated a WEL does not mean that it is safe. The exposure to these substances should be controlled to a level which

early all of the working population could experience all the time without any adverse effects to their health. Detailed guidance and references are given for such substances in the HSE ACoP and guidance to the COSHH Regulations (L5).

The HSE publishes a revised ACoP and EH40 to include these changes. More information on the COSHH Regulations is given in Chapter 15.

3.4 Control measures

3.4.1 The principles of good practice for the control of exposure to substances hazardous to health

The objective of the COSHH Regulations is to prevent health due to the exposure to hazardous substances. Employers are expected to develop suitable and sufficient control measures by:

- ▶ identifying hazards and potentially significant risks, taking action to reduce and control risks;
- ▶ keeping control measures under regular review.

In order to assist employers with these duties, the HSE has produced the following eight principles of good practice:

- 1) Design and operate processes and activities to minimise the emission, release and spread of substances hazardous to health.
 - ▶ Take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures.
 - ▶ Control exposure by measures that are proportionate to the health risk.
 - ▶ Choose the most effective and reliable control options which minimise the escape and spread of substances hazardous to health.
 - ▶ When adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment.
 - ▶ Check and review regularly all elements of control measures for their continuing effectiveness.
 - ▶ Inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures developed to minimise the risks.
 - ▶ Ensure that the introduction of control measures does not increase the overall risk to health and safety.

These principles are embodied in the following COSHH control measures.

- ▶ frequency and type of future monitoring of exposure levels will depend on the exposure found in relation to recognised exposure limits. If the exposure is very much lower than the limit and there is no change in process or other reason, then repeat measurement may only be needed occasionally.

If the exposure level is relatively high, then measurement may be needed several times between assessment reviews, to ensure that these levels have not been altered by some unidentified factor.

13.4.2 Hierarchy of control measures

The COSHH Regulations require the prevention or adequate control of exposure by measures other than personal protective equipment, so far as is reasonably practicable, taking into account the degree of exposure and current knowledge of the health risks and associated technical remedies. The hierarchy of control measures is as follows:

- ▶ elimination;
- ▶ substitution;
- ▶ provision of engineering controls;
- ▶ provision of supervisory (people) controls;
- ▶ provision of personal protective equipment.

Examples where engineering controls are not reasonably practicable include emergency and maintenance work, short-term and infrequent exposure and where such controls are not technically feasible.

Measures for preventing or controlling exposure to hazardous substances include one or a combination of the following:

- ▶ elimination of the substance;
- ▶ substitution of the substance (or the reduction in the quantity used);
- ▶ total or partial enclosure of the process;
- ▶ local exhaust ventilation;
- ▶ dilution or general ventilation;
- ▶ reduction of the number of employees exposed to a strict minimum;
- ▶ reduced time exposure by task rotation and the provision of adequate breaks;
- ▶ good housekeeping;
- ▶ training and information on the risks involved;
- ▶ effective supervision to ensure that the control measures are being followed;
- ▶ personal protective equipment (such as clothing, gloves and masks);
- ▶ welfare (including first-aid);
- ▶ medical records;
- ▶ health surveillance.

13.4.3 Preventative control measures

Prevention is the safest and most effective of the control measures and is achieved either by changing the process completely or by substituting for a less hazardous substance (the change from oil-based to water-based paints is an example of this). It may be possible to use a substance in a safer form, such as a brush paint rather than a spray.

The EU has introduced chemical safety regime REACH (Registration, Evaluation, Authorisation and restriction

of Chemicals) Regulations, which restrict the use of high-risk substances or substances of very high concern and require that safer substitutes must be used. Manufacturers and importers of chemicals are responsible for understanding and managing the risks associated with their products. Authorisation seeks to ensure that risks from these substances of very high concern (SVHCs) are properly controlled. These are substances that are carcinogenic, mutagenic or toxic for reproduction or substances that are persistent, bio-accumulative and toxic. The objective is that all such substances should be replaced where possible with less dangerous alternatives.

REACH does not replace the COSHH Regulations which place duties on employers to control the exposure of employees to hazardous substances in the workplace.

The Regulations apply to many common items, such as glues, paints, solvents, detergents, plastics, additives, polishes, pens and computers. The three main types of REACH duty-holder are:

▶ **Manufacturers/importers** – businesses that manufacture or import (from outside the EU) 1 ton or more of any given substance each year are responsible for registering a dossier of information about that substance with the European Chemicals Agency. If substances are not registered, then the data on them will not be available and it will no longer be legal to manufacture or supply them within the EU. Suppliers will be obliged to carry out an inventory and identify where in the supply chain the chemicals come from. Under the REACH system, industry will also have to prepare risk assessments and provide control measures for safe use of the substance by downstream users and get community-wide authorisations for the use of any substances considered to be of high concern.

▶ **Downstream users** – downstream users include any businesses using chemicals, which probably includes most businesses in some way. Companies that use chemicals have a duty to use them in a safe way, and according to the information on risk management measures that should be passed down the supply chain.

Other users in the supply chain – in order for suppliers to be able to assess these risks they need information from the downstream users about how they are used. REACH provides a framework in which information can be passed both up and down supply chains by using the safety data sheet. This should accompany materials down through the supply chain so that users are provided with the information that they need to ensure chemicals are safely managed. It is envisaged that, in the future, the safety data sheets will include information on safe handling and use. Some users may also be importers and have a duty to register.

An important aspect of chemical safety is the need for clear information about any hazardous chemical properties. The classification of different chemicals according to their characteristics (for example, those that are corrosive, or toxic to fish) currently fits an established system, which is reflected in the CLP (Chapter 15 contains more information on this).

13.4.4 Engineering controls

Occupational exposures to fumes, dusts and vapours together account for around 4,000 deaths a year, while some 38,000 individuals suffer breathing problems that they believe are caused by their work.

The simplest and most efficient engineering control is the segregation of people from the process, and the use of a fume cupboard is an example of this as is the use of toxic substances in a glove box. Modification of the process is another effective control to reduce the contact with hazardous substances.

More common methods, however, involve the use of forced ventilation – local exhaust ventilation and general ventilation.

Local exhaust ventilation

Local exhaust ventilation (LEV) removes the hazardous gas, vapour or fume at its source before it can contaminate the surrounding atmosphere and harm people working in the vicinity. Such systems are commonly used for the extraction of welding fumes and dust from woodworking machines. All exhaust ventilation systems have the following five basic components (Figure 13.12).

1. **A collection hood and intake** – sometimes the hood is a nozzle-shaped point which is nearest to the workpiece, while at other times it is simply a hood placed over the workstation. The speed of the air entering the intake nozzle is important; if it is too low the hazardous fume may not be removed (air speeds of up to 1 m/s are normally required). A suitable air flow indicator should make it easy to see whether the flow is adequate. New LEV systems are likely to be fitted with airflow indicators as standard.

LEV hood design is very important and poor design is the main reason that LEV fails to control exposure. It should be as close as possible to the workpiece and ergonomic principles used in the designing of LEV hoods. LEV suppliers tend to concentrate on the fan and filter system and assume that hoods are standard for all applications.

The most commonly used hood – the capturing hood – has a particular limitation as the process to be controlled takes place outside the hood and the LEV system needs to generate sufficient air flow to surround the process to 'capture' and draw in the airborne contaminant cloud. One company replaced a capturing hood with an enclosing hood fitted with

glass panel so that soldering fumes were separated from the operative's breathing zone.

Ventilation ducting – this normally acts as a conduit for the contaminated air and transports it to a filter and settling section. It is very important that this section is inspected regularly and any dust deposits removed. It has been known for ventilation ducting attached to a workshop ceiling to collapse under the added weight of metal dust deposits. It has also been known for them to catch fire.

Filter or other air cleaning device – normally located between the hood and the fan, the filter removes the contaminant from the air stream. The filter requires regular attention to remove contaminant and to ensure that it continues to work effectively.

Fan – this moves the air through the system. It is crucial that the correct type and size of fan is fitted

to a given system and it should only be selected by a competent person. It should also be positioned so that it can easily be maintained but does not create a noise hazard to nearby workers.

5. Exhaust duct – this exhausts the air to the outside of the building. The duct should be positioned on the outside wall of the building such that the air is not discharged into a public area or close to an air inlet for an air-conditioning system of any building. It should be checked regularly to ensure that the correct volume of air is leaving the system and that there are no leakages. The exhaust duct should also be checked to ensure that there is no corrosion due to adverse weather conditions.

Controlling Airborne Contaminants at Work, HSG258, HSE Books, is a very useful document on ventilation systems.

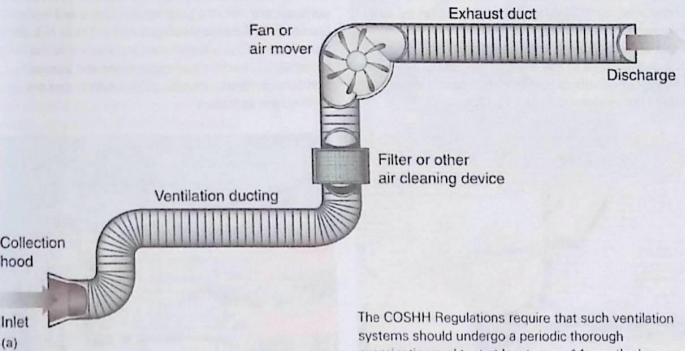


Figure 13.12 (a) A LEV system; (b) welding with an adjustable LEV system to remove dust and fumes

The COSHH Regulations require that such ventilation systems should undergo a periodic thorough examination and test at least every 14 months by a competent person to ensure that they are still operating effectively. A record of the examination should be kept for at least 5 years.

The effectiveness of a ventilation system will be reduced by damaged ducting, blocked or defective filters and poor fan performance. More common problems include the unauthorised extension of the system, poor initial design, poor maintenance, incorrect adjustments and a lack of inspection or testing.

Routine maintenance should include repair of any damaged ducting, checking filters, examination of the fan blades to ensure that there has been no dust accumulation, tightening all drive belts and a general lubrication of moving parts. LEV systems will degrade if they are not regularly checked and maintained. Dirty ventilation systems can seriously affect staff well-being and working environments, and both bacteria, MRSA and *Clostridium difficile*, have been found in duct

systems. A 'responsible person' should be appointed who follows the instructions in the user manual, arranges monitoring and maintenance, and keeps records. The employer will also need to check that operators are using the LEV correctly.

The local exhaust ventilation system will have an effect on the outside environment in the form of noise and odour. Both these problems can be reduced by regular routine maintenance of the fan and filter (Figure 13.13a). The waste material from the filter may be hazardous and require the special disposal arrangements described later in this chapter (Figure 13.13b).

Dilution (or general) ventilation

Dilution (or general) ventilation uses either natural ventilation (doors and windows) (see Figure 7.2) or a fan-assisted forced ventilation system to ventilate the whole working room by inducing a flow of clean air, using extraction fans fitted into the walls and the roof, sometimes assisted by inlet fans. It operates by either removing the contaminant or reducing its concentration to an acceptable level. It is used when airborne contaminants are of low toxicity, low concentration and low vapour density or contamination occurs uniformly across the workroom (Figure 13.13c).

Paint-spraying operations often use this form of ventilation as does the glass-reinforced plastics boat-building industry – these being instances where there are no discrete points of release of the hazardous substances. It is also widely used in kitchens and bathrooms. It is not suitable for dust extraction where it is reasonably practicable to reduce levels by other means.

There are limitations to the use of dilution ventilation. Certain areas of the workroom (e.g. corners and beside cupboards) will not receive the ventilated air and a build-up of hazardous substances occurs. These areas are known as 'dead areas'. The flow patterns are also significantly affected by doors and windows being opened or the rearrangement of furniture or equipment.

13.4.5 Supervisory or people controls

Many of the supervisory controls required for CO purposes are part of a good safety culture and will be discussed in detail in chapters 3 and 4. These include items such as systems of work, arrangements and procedures, effective communications and training. Additional controls when hazardous substances are involved are as follows:



Figure 13.13(a) Local exhaust ventilation systems can quickly corrode and need regular maintenance of fans and filters



Figure 13.13(b) Large roof level system with access platforms for maintenance of the filters and fans



Figure 13.13(c) Paint-spraying inside a special room with general ventilation to remove fumes

- ▶ Reduced time exposure – thus ensuring that workers have breaks in their exposure periods. The use of this method of control depends very much on the nature of the hazardous substance and its STEL.
- ▶ Reduced number of workers exposed – only persons essential to the process should be allowed in the vicinity of the hazardous substance. Walkways and other traffic routes should avoid any area where hazardous substances are in use.
- ▶ Eating, drinking and smoking must be prohibited in areas where hazardous substances are in use.
- ▶ Any special rules, such as the use of personal protective equipment, must be strictly enforced.

13.4.6 Personal protective equipment

Personal protective equipment (PPE) is to be used as a control measure only as a last resort. It does not eliminate the hazard and will present the wearer with the maximum health risk if the equipment fails. Successful use of PPE relies on good user training, the availability of the correct equipment at all times and good supervision and enforcement.

The 'last resort' rule applies in particular to respiratory protective equipment (RPE) within the context of hazardous substances. There are some working conditions when RPE may be necessary:

- ▶ during maintenance operations;
- ▶ as a result of a new assessment, perhaps following the introduction of a new substance;
- ▶ during emergency situations, such as fire or plant breakdown;
- ▶ where alternatives are not technically feasible.

The Personal Protective Equipment at Work Regulations state in Regulation 4: 'Every employer shall ensure that suitable personal protective equipment is provided to his employees who may be exposed to a risk to their health or safety while at work except where and to the extent that such risk has been adequately controlled by other means which are equally or more effective.' The accompanying guidance recommends that employers should, therefore, provide appropriate PPE and training in its usage to their employees wherever there is a risk to health and safety that cannot be adequately controlled by other means. Employers must do more than simply have the equipment on the premises – it must be readily available. These Regulations cover all PPE except respiratory protective equipment (which is covered by specific Regulations such as COSHH and Lead).

The principal requirements of these Regulations are as follows:

- ▶ PPE which is suitable for the wearer and the task;
- ▶ compatibility and effectiveness of the use of multiple personal protective equipment;
- ▶ a risk assessment to determine the need and suitability of proposed PPE;



Figure 13.14 Personal protective equipment

- ▶ a suitable maintenance programme for the personal protective equipment;
- ▶ suitable accommodation for the storage of the PPE when not in use;
- ▶ information, instruction and training for the user of PPE including a demonstration on how to use the equipment properly;
- ▶ the supervision of the use of PPE by employees and a reporting system for defects.

A summary of these Regulations is given in Chapter 15.

Types of personal protective equipment

There are several types of PPE such as footwear, hearing protectors and hard hats which are not primarily concerned with protection from hazardous substances; those which are used for such protection include:

- ▶ respiratory protection PPE;
- ▶ hand and skin protection PPE;
- ▶ eye protection PPE;
- ▶ protective clothing.

Table 13.3 shows the types of PPE recommended by the HSE for various parts of the body.

Table 13.3 The hazards and types of PPE for various parts of the body

	Hazards	PPE
Eyes	chemical or metal splash, dust, projectiles, gas and vapour, radiation	safety spectacles, goggles, face shields, visors.
Head	impact from falling or flying objects, risk of head bumping, hair.	a range of helmets and bump caps
Respiratory system	dust, vapour, gas, oxygen-deficient atmospheres	disposable filtering face piece or respirator, half- or full-face respirators, air-fed helmets, breathing apparatus
Hand and arms	abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, skin infection, disease or contamination	gloves, gauntlets, mitts, wrist-cuffs, armbands.
Feet and legs	wet, electrostatic build-up, slipping, cuts and punctures, falling objects, metal and chemical splash, abrasion.	safety boots and shoes with protective toe caps and penetration-resistant mid-sole, gaiters, leggings, spats
Whole body	temperature extremes, adverse weather, chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of own clothing	conventional or disposable overalls, boiler suits, specialist protective clothing, e.g. chain-mail aprons, high visibility clothing.

Source: HSE

For all types of PPE, there are some basic standards that should be reached. The PPE should fit well, be comfortable to wear and not interfere with other equipment being worn or present the user with additional hazards (e.g. impaired vision due to scratched eye goggles). Training in the use of particular PPE is essential, so that it is not only used correctly, but the user knows when to change an air filter or to change a type of glove. Supervision is essential, with disciplinary procedures invoked for non-compliance with PPE rules.

It is also essential that everyone who enters the proscribed area, particularly senior managers, wear the specified PPE.

Respiratory protective equipment

Respiratory protective equipment (RPE) can be subdivided into two categories – respirators (or face masks), which filter and clean the air, and breathing apparatus which supplies breathable air.

Respirators should not be worn in air which is dangerous to health, including oxygen-deficient atmospheres. They are available in several different forms but the common ones are:

- ▶ a **filtering half-mask** often called disposable respirator – made of the filtering material. It covers the nose and mouth and removes respirable dust particles. It is normally replaced after 6–10 hours of use. It offers protection against some vapours and gases;
- ▶ a **half-mask respirator** – made of rubber or plastic and covering the nose and mouth. Air is drawn through a replaceable filter cartridge. It can be used for vapours, gases or dusts but it is very important that the correct filter is used (a dust filter will not filter vapours);
- ▶ a **full-face mask respirator** – similar to the half-mask type but covers the eyes with a visor;
- ▶ a **powered respirator** – a battery-operated fan delivers air through a filter to the face mask, hood, helmet or visor.

Breathing apparatus is used in one of three forms (Figure 13.15):

- ▶ **self-contained breathing apparatus** – where air is supplied from compressed air in a cylinder and through a completely sealed system;
- ▶ **fresh air hose apparatus** – fresh air is delivered through a hose to a sealed face mask from an uncontaminated source. The air may be delivered to the wearer, by natural breathing or mechanically by a fan;
- ▶ **compressed air-line apparatus** – air is delivered through a hose from a compressed air line. This may be either continuous flow or on demand. The air must be properly filtered to remove oil, excess water and other contaminants and the air pressure must be reduced. Special compressors are normally used.

The selection of appropriate RPE and correct filters for particular hazardous substances is best done by a competent specialist person.

There are several important technical standards which must be considered during the selection process. RPE must either be CE marked or HSE approved (HSE approval ceased in 1995 but such approved equipment may still be used). Other standards include the minimum protection required (MPR) and the assigned protection factor (APF). The CE mark does not indicate that the equipment is suitable for a particular hazard. The following information will be needed before a selection of suitable RPE can be made:

- ▶ details of the hazardous substance, in particular whether it is a gas, vapour or dust or a combination of all three;
- ▶ presence of a beard or other facial hair which could prevent a good leak-free fit (a simple test to see whether the fit is tight or not is to close off the air supply, breathe in and hold the breath. The respirator should collapse onto the face. It should then be possible to check to see if there is a leak);
- ▶ the size and shape of the face of the wearer and physical fitness;

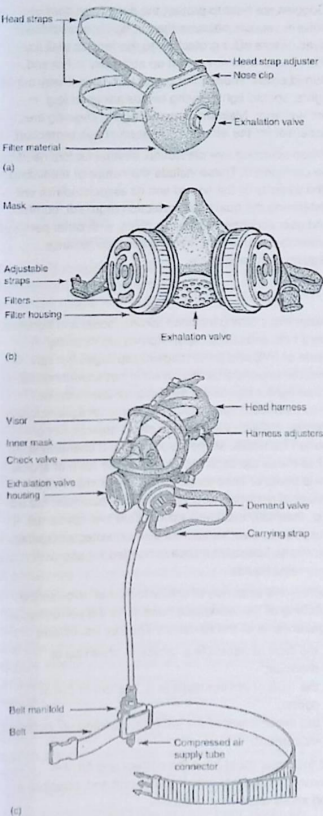


Figure 13.15 Types of respiratory protective equipment. (a) filtering half mask; (b) half-mask - reusable with filters; (c) compressed air-line breathing apparatus with full face fitted with demand valve

- ▶ compatibility with other personal protective equipment, such as ear defenders;
- ▶ the nature of the work and agility and mobility required.

Filters and masks should be replaced at the intervals recommended by the supplier or when taste or smell is detected by the wearer.

The performance of RPE with a tight-fitting face piece depends on a good contact between the wearer's skin and the face seal of the mask. However, research by the British Safety Industry Federation indicated that up to 50% of all RPE used does not offer the wearer the level of protection assumed, usually because it was not fitted correctly.

The COSHH Approved Code of Practice states that 'Employers should ensure that the selected face piece is of the right size and can correctly fit each wearer. For a tight-fitting face piece, the initial selection should include fit testing to ensure the wearer has the correct device. Also, employers must ensure that whoever carries out the fit testing is competent to do so.'

The British Safety Industry Federation (working with the HSE) has developed 'Fit2Fit', an accreditation scheme for people performing face piece fit testing. An HSE document 'Fit testing of RPE face pieces' provides more detail on fit testing methods. The HSE uses the term 'face piece' and defines this to mean a full-face mask, a half-face mask, or a filtering face piece/disposable mask. Fit2Fit standards are based on this HSE document.

Fit testing is needed when RPE is used as a control measure not when it is worn by choice for comfort. Fit testing should be repeated if the shape of the face of the wearer changes for any reason, such as weight loss or gain. Re-testing is recommended to check that the face piece remains suitable and that the wearer is taking care to wear and remove the mask correctly. A two-year cycle has been suggested, and a one-year re-test is suggested for work with asbestos.

Fit testing can be qualitative or quantitative. Qualitative testing involves a simple pass or fail based on whether the user can taste or smell a harmless aerosol or odour through the RPE. Qualitative testing is only appropriate for disposable or half-face masks.

A quantitative fit test may use a laboratory test chamber or a portable fit test device, and produces a numerical 'fit factor' measure. The British Safety Industry Federation 'Fit2Fit' website provides details of accredited Fit2Fit training providers. The results of fit tests should be recorded. Fit test records must be made available to the HSE on request, and to the employees who wear RPE. RPE should be checked every time that it is used to make sure it has not been damaged and is being worn correctly.

A filtering face piece (FFP3) device is a mask which is certified to the PPE Directive. It provides a high level of filtering capability and face fit. It can be supplied with an exhale valve so that it can be worn comfortably over a fairly long period of time. It will provide an effective barrier to both droplets and fine aerosols and is the type recommended particularly for people in the healthcare sector dealing with symptomatic patients undergoing treatment where aerosols are likely to be generated.

All RPE should be examined at least once a month except for disposable respirators. A record of the inspection should be kept for at least 5 years. There should be a routine cleaning system in place and proper storage arrangements.

Respiratory Protective Equipment – A Practical Guide for Users, HSG53, HSE Books, contains comprehensive advice and guidance on RPE selection, use, storage, maintenance and training, and should be consulted for more information.

Hand and skin protection

Hand and skin protection is mainly provided by gloves (arm shields are also available). A wide range of safety gloves is available for protection from chemicals, sharp objects, rough working and temperature extremes.

Many health and safety catalogues give helpful guidance for the selection of gloves. For protection from chemicals, including paints and solvents, impervious gloves are recommended. These may be made of PVC, nitrile or neoprene. For sharp objects, such as trimming knives, a Kevlar-based glove is the most effective. Gloves should be regularly inspected for tears or holes since this will obviously allow skin contact to take place.

Another effective form of skin protection is the use of barrier creams and these come in two forms – pre-work and after-work. Pre-work creams are designed to provide a barrier between the hazardous substance and the skin. After-work creams are general purpose moisturisers which replace the natural skin oils removed either by solvents or by washing.

Eye protection

Eye protection comes in three forms – spectacles (safety glasses), goggles and face visors. Eyes may be damaged by chemical and solvent splashes or vapours, flying particles, molten metals or plastics, non-ionising radiation (arc welding and lasers) and dust. Spectacles are suitable for low-risk hazards (low-speed particles such as machine swarf). Some protection against scratching of the lenses can be provided but this is the most common reason for replacement. Prescription lenses are also available for people who normally wear spectacles.



Figure 13.16 Variety of eye protection goggles

Goggles are best to protect the eyes from dust and solvent vapours because they fit tightly around the eyes. Visors offer protection to the face as well as the eyes and do not steam up so readily in hot and humid environments. For protection against very bright lights, special light filtering lenses are used (e.g. arc welding). Maintenance and regular cleaning are essential for the efficient operation of eye protection.

When selecting eye protection, several factors need to be considered. These include the nature of the hazard (the severity of the hazard and its associated risks), determine the quality of protection required), comfort and user acceptability, compatibility with other personal protective equipment, training and maintenance requirements and costs.

Protective clothing

Protective clothing includes aprons, boots and headgear (hard hats and bump caps). Aprons are normally made of PVC and protect against spillages but can become uncomfortable to wear in hot environments. Other lighter fabrics are available for use in these circumstances. Safety footwear protects against falling objects, collision with hard or sharp objects, hot or molten materials, slippery surfaces and chemical spills. It has metal toe caps and comes in the form of short ankle boots or knee-length boots and is made of a variety of materials dependent on the particular hazard (e.g. thermally insulated against cold environments). It must be used with care near live, unprotected electrical equipment. Specialist advice is needed for use with flammable liquids.

Appropriate selection of safety footwear involves the matching of the workplace hazards to the performance requirements of the footwear. The key issues are:

- ▶ the type of hazard (e.g. physical, chemical or thermal);
- ▶ the type of environment (e.g. indoors or out of doors);
- ▶ the ergonomics of the job (e.g. standing up, continuous movement).

The footwear must have the correct grip for the environment, a hard wearing sole unit and, possibly, a good shock-absorbing capability.

It is important to note that appropriate personal protective equipment should be made available to work-related visitors and other members of the public visiting workplaces where hazardous substances are being used. It is also important to stress that managers and supervisors must lead by example, particularly if there is a legal requirement to wear particular personal protective equipment. Refusals by employees to wear mandatory personal protective equipment must lead to some form of disciplinary action.

In 2002, some extra requirements were added to the Personal Protective Equipment Regulations.

- ▶ The personal protective equipment must satisfy the basic health and safety requirements which are applicable to that class or type of personal protective equipment.
- ▶ The appropriate conformity assessment procedures must be carried out.
- ▶ CE marking must be correctly affixed.
- ▶ The personal protective equipment must not compromise the safety of individuals, domestic animals or property when properly maintained and used.

13.4.7 Health surveillance and personal hygiene

The need for health surveillance in assessing exposure to hazardous substances has already been introduced in Section 13.2.6. It is required when as a result of reviewing sickness records or when a substance listed in Schedule 6 under Regulation 11 of the COSHH Regulations is being used there appears to be a reasonable chance that ill-health effects are occurring in a particular workplace. Schedule 6 lists the substances and the processes in which they are used. There are a limited number of such substances and includes medical surveillance by an employment medical adviser or appointed doctor at intervals not exceeding 12 months. The need for health surveillance is not common and further advice on the necessary procedures is available from the Employment Medical Advisory Service.

Health surveillance enables the identification of those employees most at risk from occupational ill-health. It should not be confused with health monitoring procedures such as pre-employment health checks or drugs and alcohol testing, but it covers a wide range of situations, from a responsible person looking for skin damage on hands to medical surveillance by a medical doctor. Health surveillance allows for early identification of ill-health and helps identify any corrective action needed. It may be required by law if employees are exposed to noise or vibration, solvents, isocyanates or other respiratory sensitisers, fumes, dusts, biological agents and asbestos, lead, work in compressed air or with ionising radiation. Health surveillance is a system of ongoing health checks and is important for:

- ▶ detecting ill-health effects at an early stage, so employers can introduce better controls to prevent them getting worse;
- ▶ providing data to help employers evaluate health risks;
- ▶ enabling employees to raise concerns about how work affects their health;
- ▶ highlighting lapses in workplace control measures, therefore providing invaluable feedback to the risk assessment;
- ▶ providing an opportunity to reinforce training and education of employees (e.g. on the impact of health effects and the use of protective equipment).

When initiating a health surveillance programme, it is important to avoid blanket coverage for all employees as this can produce misleading results and waste money.

The risk assessment for the organisation should indicate when and where health surveillance is required. In its simplest form, health surveillance could involve employees checking themselves for signs or symptoms of ill-health following a training session – for example, soreness, redness and itching on their hands and arms if they work with substances that can irritate or damage the skin. A responsible person, who has been trained by a competent medical practitioner, can also make routine basic checks, such as skin inspections for signs of rashes.

For more complicated assessments, an occupational health nurse or an occupational health doctor can ask about symptoms or carry out periodic examinations. Statutory medical surveillance involves a medical examination and possibly tests by a doctor with appropriate training and experience.

A health record must be kept for all employees under health surveillance. Health records, or a copy, should be kept in a suitable form for at least 40 years from the date of last entry because often there is a long period between exposure and onset of ill-health. Recorded details of each health surveillance check should include:

- ▶ the date they were carried out and by whom;
- ▶ the outcome of the test/check;
- ▶ the decision made by the occupational health professional in terms of fitness for task and any restrictions required. This should be factual and only relate to the employee's functional ability and fitness for specific work, with any advised restrictions.

Health records are different to medical records in that they should not contain confidential medical information.

Personal hygiene has already been covered under supervisory controls. It is very important for workers exposed to hazardous substances to wash their hands thoroughly before eating, drinking or smoking. Protection against biological hazards can be increased significantly by vaccination (e.g. tetanus). Finally, contaminated clothing and overalls need to be removed and cleaned on a regular basis.

13.4.8 Maintenance and emergency controls

Engineering control measures will only remain effective if there is a programme of preventative maintenance available. Indeed the COSHH Regulations require that systems of adequate control are in place and the term 'adequate control' spans normal operations, emergencies and maintenance. Maintenance will involve the cleaning, testing and, possibly, the dismantling of equipment. It could involve the changing of filters in extraction plant or entering confined spaces. It will almost certainly require hazardous substances

to be handled and waste material to be safely disposed of. It may also require a permit-to-work procedure to be in place since the control equipment will be inoperative during the maintenance operations. Records of maintenance should be kept for at least 5 years.

Emergencies can range from fairly trivial spillages to major fires involving serious air pollution incidents. The following points should be considered when emergency procedures are being developed:

- ▶ the possible results of a loss of control (e.g. lack of ventilation);
- ▶ dealing with spillages and leakages (availability of effective absorbent materials);
- ▶ raising the alarm for more serious emergencies;
- ▶ evacuation procedures, including the alerting of neighbours;
- ▶ fire-fighting procedures and organisation;
- ▶ availability of respiratory protective equipment;
- ▶ information and training.

The Emergency Services should be informed of the final emergency procedures and, in the case of the Fire Service, consulted for advice during the planning of the procedures. (See Chapter 4 for more details on emergency procedures.)

13.4.9 The transport of hazardous substances by road

Although this topic is not in the NEBOSH National General Certificate syllabus, a brief mention of the main precautions required to safeguard the health and safety of those directly involved in the transport of hazardous substances and of general members of the public is important.

Data sheets from the manufacturer of the hazardous substance should indicate the safest method of handling it and will give information on emergency procedures (e.g. for spillages and fire). These sheets should be available to all concerned with the transportation of the substance, in particular those responsible for loading/unloading, as well as the driver. The hazardous substance should be loaded correctly on the vehicle in suitable containers and segregated from incompatible materials. There must be adequate emergency information with the substance containers and attached to the vehicle.

Drivers of the vehicles must receive special training which covers issues such as emergency procedures and route planning. There should also be emergency provisions for first-aid and personal protective equipment on the vehicle. Finally, the Transport of Dangerous Goods (Safety Adviser) Regulations require the appointment of a trained and competent safety adviser to ensure the safe loading, transportation and unloading of the hazardous substance. The HSE has produced several guidance publications which offer more detailed advice on this topic.

13.4.10 An illustrative example of COSHH controls

Organic solvents are widely used throughout industry and commerce in paints, inks, glues and adhesives. The COSHH hierarchy discussed under 13.4.2 should be applied to minimise the health risks from these solvents. The top of this hierarchy is to eliminate or substitute the use of the organic solvent by a less volatile or water-based alternative. If this is not possible, then some form of engineering control should be applied, such as dilution or local exhaust ventilation. Alternatively, the workplace, where the solvent is being used, could be enclosed or isolated from other work activities. Other engineering type controls include the use of properly labelled anti-spill containers, the use of covered disposal units for any used solvent and the transfer of large quantities using pumping arrangements rather than simply pouring the solvent.

Supervisory controls include the reduction in the length of time any employee is exposed to the solvent and the provision of good housekeeping, such as ensuring that containers are kept closed when not in use and any spills are quickly removed. The provision of first-aid kits, eye creams and personal protective equipment (eye protection, gloves and aprons) and RPE may also be required. Welfare issues will include first-aid provisions, washing facilities and the encouragement of high standards of personal hygiene. Smoking and the consumption of food and drink should be prohibited where there is a risk of contamination from organic solvents. All these supervisory items should be reinforced in training sessions and employees given appropriate information on the risks associated with the solvents. Finally, some form of health surveillance will be needed so that employees who show allergies to the solvents can be treated and, possibly, assigned other duties.

13.5 Specific agents

13.5.1 Health risks and controls associated with asbestos

It is estimated that 1.8 million workers remain at risk every day from the possible disturbance of this carcinogenic material. Those most at risk are workers such as electricians, plumbers, joiners and IT installers. Asbestos is responsible for over 4,500 deaths every year and 4 plumbers, 20 tradesmen, 6 electricians and 8 joiners die every week. Younger people, if routinely exposed to asbestos fibres over time, are at greater risk of developing asbestos-related disease than older workers. This is due to the time it takes for the body to develop symptoms after exposure to asbestos (latency). Exposure to asbestos can cause four main diseases:

- ▶ Mesothelioma (a cancer of the lining of the lungs, which is always fatal and is almost exclusively caused by exposure to asbestos).

- ▶ Asbestos-related lung cancer (which is almost always fatal).
- ▶ Asbestosis (a scarring of the lungs which is not always fatal but can be a very debilitating disease, greatly affecting quality of life).
- ▶ Diffuse pleural thickening (a thickening of the membrane surrounding the lungs which can restrict lung expansion leading to breathlessness).

The number of mesothelioma deaths is more than 2,000 each year and increasing year on year. Most mesothelioma deaths occurring now are a legacy of past occupational exposures to asbestos when it was widely used in the building industry.

Asbestos appears in three main forms – crocidolite (blue), amosite (brown) and chrysotile (white). The blue and brown asbestos are considered to be the most dangerous and may be found in older buildings where they were used as heat insulators around boilers and hot water pipes and as fire protection of structures. White asbestos has been used in asbestos cement products and brake linings. It is difficult to identify an asbestos product by its colour alone – laboratory identification is usually required. Many asbestos-containing materials (ACMs) are difficult to distinguish from other materials. It is easy to drill or cut ACMs unwittingly and release large quantities of airborne fibres that could cause long-term health problems to the operator. Asbestos produces a fine fibrous dust of respirable dust size which can become lodged in the lungs. The fibres can be very sharp and hard causing damage to the lining of the lungs over a period of many years.

The condition of the ACM will need to be monitored regularly and a record kept. The time between these monitoring checks should not exceed 12 months and may need to be more frequent. Monitoring involves visual inspection to see whether there has been any deterioration at the surface of the ACM. This may be remedied by resealing the surface or removing a section of the ACM.

If asbestos is discovered during the performance of a contract, work should cease immediately and the employer informed. Typical sites of asbestos include ceiling tiles, asbestos cement roof and wall sheets, sprayed asbestos coatings on structural members, loft insulation and asbestos gaskets. Asbestos has its own Regulations (Control of Asbestos Regulations) and a summary of these is given in Chapter 15. These cover the need for a risk assessment, a method statement covering removal and disposal, air-monitoring procedures and the control measures (including personal protective equipment and training) to be used.

Training is required for the majority of workers involved in maintenance, refurbishment and demolition. The Health and Safety Executive (HSE) has estimated that approximately 50% of buildings still contain some form of asbestos and about 1.5 million workers require asbestos training.

The most recent Asbestos Regulations have removed textured coatings (decorative products such as Artex, Wondertex and Pebblecoat) from the asbestos licensing regime. Until 1992, these products contained white asbestos. This amendment by the HSE followed research work by the Health and Safety Laboratory. The new Regulations introduce an additional training requirement for asbestos awareness training. Such training should include:

- ▶ the health risks caused by exposure to asbestos;
- ▶ the materials that are likely to contain asbestos and where they are likely to be found;
- ▶ the methods to reduce asbestos risks during work;
- ▶ the action to take in an emergency, such as an uncontrolled release of asbestos dust.

Asbestos is the single biggest workplace killer.

According to HSE statistics, there are 15 times as many deaths from asbestos as there are deaths from workplace accidents. Asbestos is responsible for at least 4,000 deaths in the UK each year, and the HSE felt that there was a need to increase awareness amongst the workforce of the risks associated with this material.

13.5.2 Managing asbestos in buildings

A recent study published by the *British Medical Journal* has found that there are over 1,800 mesothelioma deaths each year in Britain. Since this disease can take between 15 and 60 years to develop, the peak of the epidemic has still to be reached. In the construction industry, those at risk are asbestos removal workers and those, such as electricians, plumbers and carpenters, who are involved in refurbishment, maintenance or repair of buildings.

It was used widely as a building material until the mid-1980s. Although much asbestos has been removed from buildings, it has been estimated that over half a million non-domestic buildings still have asbestos in them amounting to many thousands of tons.

The strategy of the HSE is to ensure that those involved in the repair, removal or disturbance of asbestos-containing materials (ACMs), such as insulation, coatings or insulation boards, are licensed, competent and working to the strict requirements of the Control of Asbestos Regulations. This requires the identification of ACMs and the planning of any subsequent work. This should prevent inadvertent exposure to asbestos and minimise the risks to those who have to work with it.

The Regulations bring together the three previous sets of Regulations covering the prohibition of asbestos, the control of asbestos at work and asbestos licensing. The duty to manage asbestos is a legal requirement under the Control of Asbestos Regulations (Regulation 4). It applies to the owners and occupiers of commercial premises (such as shops, offices, industrial units, etc.) who have responsibility for maintenance and repair activities. In addition to these responsibilities, they also

have a duty to assess the presence and condition of any asbestos-containing materials. If asbestos is present, or is presumed to be present, then it must be managed appropriately.

The Regulations also prohibit the importation, supply and use of all forms of asbestos. They continue the ban introduced for blue and brown asbestos in 1985 and for white asbestos in 1999. They also continue the ban on the second-hand use of asbestos products such as asbestos cement sheets and asbestos boards and tiles; including panels which have been covered with paint or textured plaster containing asbestos. The ban applies to new uses of asbestos. If existing ACMs are in good condition, they may be left in place and their condition monitored and managed to ensure that they are not disturbed. The Regulations only cover the safe management of asbestos in industrial and commercial premises. Domestic premises are covered by the Defective Premises Act and the Civic Government (Scotland) Act although the Control of Asbestos Regulations apply to the shared parts of some domestic premises.

The Regulations also include the duty to manage asbestos in non-domestic premises. Guidance on the duty to manage asbestos can be found in the HSE ACoP – *Managing and working with asbestos*, L143.

The Regulations require mandatory training for anyone liable to be exposed to asbestos fibres at work, including maintenance workers and others who may come into contact with or who may disturb asbestos (e.g. cable installers) as well as those involved in asbestos removal work.

When work with asbestos or which may disturb asbestos is being carried out, the Regulations require employers and the self-employed to prevent exposure to asbestos fibres. Where this is not reasonably practicable, they must make sure that exposure is kept as low as reasonably practicable by measures other than the use of respiratory protective equipment. The spread of asbestos must be prevented. The Regulations specify the work methods and controls that should be used to prevent exposure and spread.

Worker exposure must be below the airborne exposure limit (the Control Limit) of 0.1 fibres per cm^3 for all types of asbestos. The Control Limit is the maximum concentration of asbestos fibres in the air (averaged over any continuous 4-hour period) and must not be exceeded. Short-term exposures must be strictly controlled and worker exposure should not exceed 0.6 fibres per cm^3 of air averaged over any continuous 10-minute period using respiratory protective equipment if exposure cannot be reduced sufficiently using other means. Respiratory protective equipment is an important part of the control regime but it must not be the sole measure used to reduce exposure and should only be used to supplement other measures.

Most asbestos removal work must be undertaken by a licensed contractor but any decision on whether particular work needs to be licensed is based on the level of risk. Details are given in Chapter 15 of the possible reasons for work with asbestos being from licensing.

The Control of Asbestos Regulations requires the control of premises and the duty-holders to:

- ▶ take reasonable steps to determine the location and condition of materials likely to contain asbestos;
- ▶ presume materials contain asbestos unless there is strong evidence that they do not;
- ▶ make and keep an up-to-date record of the location and condition of the ACMs or presumed ACMs on the premises;
- ▶ assess the risk of the likelihood of anyone being exposed to fibres from these materials;
- ▶ prepare a plan setting out how the risks from these materials are to be managed;
- ▶ take the necessary steps to put the plan into effect;
- ▶ review and monitor the plan periodically;
- ▶ provide such information and asbestos awareness training to anyone who is liable to work on these materials or otherwise disturb them.

In addition, the Regulations include the following provisions:

1. A single tighter control limit for all types of asbestos;
2. Specific training requirements for those working with asbestos.
3. A clear hierarchy of controls to be used to reduce exposure.

The HSE has produced a document – *HSG 264 Asbestos: The survey guide* – that gives useful guidance on asbestos surveys. There are **two** types of survey known in the UK as the **management survey** and the **refurbishment and demolition survey**.

A **management survey** is the standard survey. Its purpose is to locate, as far as reasonably practicable, the presence and extent of any suspect ACMs in the building which could be damaged or disturbed during normal occupancy, including foreseeable maintenance and installation, and to assess their condition. A management survey is required during the normal use of the building to ensure continued management of the ACMs. It should include an assessment of the condition of the various ACMs and their ability to release fibres into the air should they be disturbed in some way. It will often involve minor intrusive work in some disturbance.

Management surveys can involve a combination of sampling to confirm asbestos is present or presumed to be present. All ACMs should be identified as far as is reasonably practicable. The areas inspected should include under floor coverings, above false ceilings (ceiling voids), cladding and partitions, under carpets, tiles and floors, lofts, inside risers, service

ducts and lift shafts, and basements, cellars or underground rooms. In these situations, controls should be put in place to prevent the spread of debris, which may include asbestos.

A **refurbishment or demolition survey** is used to locate and describe, as far as reasonably practicable, all ACMs in the area where the refurbishment work will take place or in the whole building if demolition is planned. It is necessary when the building (or part of it) is to be upgraded, refurbished or demolished. It is required for all work which disturbs the fabric of the building in areas particularly where the management survey has not been intrusive. A refurbishment and demolition survey is needed before any refurbishment or demolition work is carried out.

Refurbishment and demolition surveys should only be conducted in unoccupied areas to minimise risks to the public or employees on the premises. Ideally, the building should not be in service and all furnishings removed.

For minor refurbishment, this would only apply to the room involved or even part of the room where the work is small and the room large. In these situations, there should be effective isolation of the survey area (e.g. full floor to ceiling partition), and furnishings should be removed as far as possible or protected using sheeting.

The person who undertakes any of these surveys must be suitably trained and experienced in such work.

Some types of work, of an intermittent and low intensity nature, will not have to be done by a licensed contractor – artex work is an example of this.

There are many issues which need to be addressed when asbestos is possibly present in a workplace. Several publications are available from HSE Books which cover all these issues in some detail and the reader should refer to them for more information. Here a brief summary of the principal issues will be given.

Identification of the presence of asbestos is the first action. Asbestos is commonly found as boiler and pipe lagging, insulation panels around pillars and ducting for fire protection and heat insulation, ceiling tiles and asbestos cement products, including asbestos cement sheets. The main duty-holder is required to ensure that a written plan is prepared that shows where the ACM is located and how it will be managed to prevent exposure to asbestos, including to contractors and other workers who may undertake work on the fabric of the building that could disturb the ACM. This plan then needs to be put into action and communicated to those affected. The duty-holder should ensure that the plan is reviewed regularly and updated as circumstances change, in consultation with all those who may be affected. The plan, including drawings, should be available on site for the entire life of the premises and should be kept up to date.

Initial investigations will involve the examination of building plans, the determination of the age of the building and a thorough examination of the building. Advice is available from a number of reputable specialist consultants and details may be obtained from the local authority, who often offers such a service. If the specialist is in any doubt, a sample of the suspect material will be sent to a specialist laboratory for analysis. It is important for a specialist to take the sample because the operation is likely to expose loose fibres.

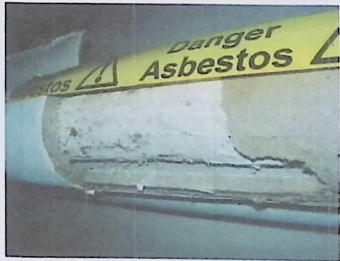


Figure 13.17 Damaged asbestos lagging on pipework

The **asbestos risk register** is a key component of the asbestos management. The management plan must contain current information about the presence and condition of any asbestos in the building. The asbestos risk register will therefore need to be updated on a regular basis (at least once a year). This will involve:

- ▶ regular inspections to check the current condition of asbestos materials;
- ▶ deletions to the register when any asbestos is removed;
- ▶ additions to the register when new areas are surveyed and asbestos is located;
- ▶ changes to the register (at any time asbestos-containing materials are found to have deteriorated).

The register can be kept as a paper or electronic record and it is very important that this is kept up to date and easily accessible should any future maintenance be necessary. Paper copies may be easier to pass on to visiting maintenance workers, who will need them to know the location and condition of any asbestos before they start work. Electronic copies are easier to update and are probably better suited for people responsible for large numbers of properties or bigger premises.

An example of an asbestos register is available on the HSE website.

Assessment is an evaluation or asbestos survey to determine whether the location or the condition could lead to the asbestos being disturbed. If it is in good condition, undamaged and not likely to be disturbed, then it is usually safer to leave it in place and monitor it. However, if it is in a poor condition, it may need to be repaired, sealed, enclosed or removed. If there is doubt, then specialist advice should be sought. The condition of the ACM will need to be monitored regularly and a record kept. The time between these monitoring checks should not exceed 12 months and may need to be more frequent. Monitoring involves visual inspection to see whether there has been any deterioration at the surface of the ACM. This may be remedied by resealing the surface or removing a section of the ACM.

The asbestos survey should provide enough information so that an asbestos register, a risk assessment and a management plan can then be prepared. The survey will usually involve sampling and analysis to determine the presence of asbestos so asbestos surveys should only be carried out by competent surveyors who can clearly demonstrate they have the necessary skills, experience and qualifications.

Removal must only be done by a licensed contractor.

A detailed plan of work is essential before work begins. The plan should give details of any equipment to be used for the protection and decontamination of employees and others. This process will also require an assessment to be made to ensure that people within the building and neighbours are properly protected. At the planning stage, generally, the HSE or the Local Authority must be notified of the intention to remove asbestos (at least 14 days' notice) and again when the work begins. This is particularly important when the exposure to asbestos is likely to exceed the action level. The assessment should include details of the type and location of the asbestos, the number of people who could be affected, the controls to be used to prevent or control exposure, the nature of the work, the removal methods, the procedures for the provision of personal and respiratory protective equipment and details of emergency procedures. If asbestos cement sheeting is to be removed the following procedure is recommended:

- ▶ Where reasonably practicable, remove the asbestos sheets before any other operation, such as demolition.
- ▶ Avoid any breaking of the sheets.
- ▶ Dampen the sheets while working on them.
- ▶ Lower the sheets on to a clean hard surface.
- ▶ Remove all waste and debris from the site as soon as possible to prevent its spread around the site.
- ▶ Do not bulldoze broken asbestos cement or sheets into piles.
- ▶ Do not dry sweep asbestos cement debris.
- ▶ Dispose of the waste and debris safely, separate from general waste as hazardous waste.



Figure 13.18 High hazard vacuum cleaner to clean asbestos material

Control measures during the removal of asbestos include the provision of personal and RPE including overalls, good ventilation arrangements in and the segregation or sealing of the working area, suitable method statements and air-monitoring procedures. A decontamination unit should also be provided. The sealed area will need to be tested for leaks. Good supervision and induction of the workforce are also essential. A high level of personal hygiene must be expected for all workers and the provision of welfare amenity arrangements, particularly washing and catering facilities and the separation of working and personal clothing. Suitable warning signs must be displayed at extra controls provided if the work is taking place at height. After the work is completed, the area must be thoroughly cleaned and a clean air certificate provided after a successful air test.

Work with high-risk asbestos products, such as asbestos insulating board, sprayed fire or insulation coatings or lagging, must only be carried out by an asbestos licence holder who works within the conditions of their licence.

Medical surveillance in the form of a regular medical examination by an appointed doctor should be given to any employee who has been exposed to asbestos at levels above the action level. The first medical examination should take place within 2 years of exposure and further examinations at intervals of not

more than 2 years. A health record of such surveillance should be kept for a period of at least 40 years after the last entry.

Awareness training is an important feature of the Control of Asbestos Regulations and they require that adequate information, instruction and training are given to those of his/her employees:

- (a) who are or who are liable to be exposed to asbestos, or who supervise such employees; and/or
- (b) who carry out work in connection with the employer's duties under these Regulations, so that they can carry out that work effectively.

Such training should cover the following topics:

- ▶ properties of asbestos and its effects on health, including its interaction with smoking;
- ▶ the types of products or materials likely to contain asbestos;
- ▶ the uses and location of ACMs in buildings and plant;
- ▶ the operations which could result in asbestos exposure and the importance of preventative controls to minimise exposure;
- ▶ the presence of other hazards such as working at height;
- ▶ the requirements of the Control of Asbestos Regulations;
- ▶ safe work practices, control measures, and protective equipment;
- ▶ the purpose, choice, limitations, proper use and maintenance of RPE;
- ▶ emergency procedures;
- ▶ hygiene requirements;
- ▶ decontamination procedures;
- ▶ waste handling procedures;
- ▶ medical examination requirements; and
- ▶ the control limit and the need for air monitoring.

Refresher training should be given at regular intervals (at least annually) and adapted to take account of significant changes in the type of work carried out or methods of work used by the employer. It should be provided in a manner appropriate to the nature and degree of exposure identified by the risk assessment, and so that the employees are aware of:

- ▶ the significant findings of the risk assessment; and
- ▶ the results of any air monitoring carried out with an explanation of the findings.

Disposal of asbestos waste is subject to the Hazardous Waste Regulations which require it to be consigned to an authorised asbestos waste site only. Asbestos waste describes any asbestos products or materials that are ready to be disposed. This includes any contaminated building materials, dust, rubble, used tools that cannot be decontaminated, disposable PPE and damp rags that have been used for cleaning. Asbestos waste must be placed in suitable packaging to prevent any fibres being released. This should be double

wrapped and appropriately labelled. Standard practice is to use a red inner bag marked up with asbestos warning labels and a clear outer bag with appropriate hazard markings. Intact asbestos cement sheets and textured coatings that are firmly attached to a board should not be broken up into smaller pieces. These should instead be carefully double wrapped in suitable polythene sheeting (1000 gauge) and labelled.

The waste container must be strong enough to securely contain the waste and not become punctured; it must be easily decontaminated and kept securely on the site until required. The waste must only be carried by a licensed carrier.

Accidental exposure to ACMs can occur even when all reasonable precautions have been taken. If an ACM has been worked on by a worker who did not realise that it was an ACM or has accidentally damaged an ACM, then all work must stop immediately and nobody should be allowed to enter the area in question. The work supervisor must be informed and a sample of the material sent for analysis. If the result is positive, then a specialist licensed contractor should be employed unless the work is exempt from the need for a licence. Any contaminated clothing must be removed and placed in a plastic bag. The affected worker should shower as soon as possible or wash thoroughly.

More information on the legislative requirements is given in Chapter 15.

13.5.3 Health risks and controls associated with other specific agents

The health hazards associated with hazardous substances can vary from very mild (momentary dizziness or a skin irritation) to very serious, such as a cancer.

Cancer is a serious body cell disorder in which the cells develop into tumours. There are two types of tumour – benign and malignant. Benign tumours do not spread but remain localised within the body and grow slowly. Malignant tumours are called cancers and often grow rapidly, spreading to other organs using the bloodstream and lymphatic system. Survival rates have improved dramatically in recent years as detection methods have improved and the tumours can be found in their early stages of development.

Workplace exposures leading to occupational illness and work-related cancers account for 8,000 of which half are caused by asbestos. Five of the key causes of occupational cancer registrations and deaths are:

- ▶ Diesel engine exhaust emissions – related deaths in the UK are estimated at 650 a year to lung or bladder cancer.
- ▶ Solar radiation – at over 1,500 a year.
- ▶ Asbestos – as covered earlier.

- ▶ Shift work – causes an estimated 2,000 cases of breast cancer a year
- ▶ Silica – over 600 cancer registrations.

A minority of cancers are believed to be occupational in origin.

Occupational asthma has approximately 4 million sufferers in the UK and it is estimated that 13 million working days are lost each year as a result of it. It is mainly caused by breathing in respiratory sensitisers, such as wood dusts, organic solvents, solder flux fumes or animal hair. The symptoms are coughing, wheezing, tightness of the chest and breathlessness due to a constriction of the airways. It can be a mild attack or a serious one that requires hospitalisation. There is some evidence that stress can trigger an attack.

The following common agents of health hazards will be described together with the circumstances in which they may be found (those marked* are **not** in the NEBOSH National General Certificate syllabus).

Ammonia* is a colourless gas with a distinctive odour which, even in small concentrations, causes the eyes to smart and run and a tightening of the chest. It is a corrosive substance which can burn the skin, burn and seriously damage the eye, cause soreness and ulceration of the throat and severe bronchitis and oedema (excess of fluid) of the lungs. Good eye and respiratory protective equipment (RPE) is essential when maintaining equipment containing ammonia. Any such equipment should be tested regularly for leaks and repaired promptly if required. Ammonia is also used in the production of fertilisers and synthetic fibres. Most work on ammonia plant should require a permit-to-work procedure.

Chlorine* is a greenish, toxic gas with a pungent smell which is highly irritant to the respiratory system, producing severe bronchitis and oedema of the lungs and may also cause abdominal pain, nausea and vomiting. It is used as a disinfectant for drinking water and swimming pool water and in the manufacture of chemicals.

Organic solvents* are used widely in industry as cleansing and degreasing agents. There are two main groups – the hydrocarbons (includes the aromatic and aliphatic hydrocarbons, such as toluene and white spirit) and the non-hydrocarbons (such as trichloroethylene and carbon tetrachloride). All organic solvents are heavier than air and most are sensitisers and irritants. Some are narcotics, while others can cause dermatitis and after long exposure periods liver and kidney failure. It is very important that the safety data sheet accompanying the particular solvent is read and the recommended personal protective equipment is worn at all times.

Solvents are used extensively in a wide variety of industries as varnishes, paints, adhesives, glue strippers, printing inks and thinners. They are highest risk when used as sprays. One of the most hazardous

is dichloromethane (DCM), also known as methylene chloride. It is used as a paint stripper, normally as a Category 3 carcinogen in the European Union. Minimum personal protective equipment requirements are impermeable overalls, apron, footwear, gloves and gauntlet and chemically resistant goggles or face shield. Respiratory protective equipment is also required. It cannot be demonstrated that exposure is below the appropriate workplace exposure limit (WEL).

Carbon dioxide* is a colourless and odourless gas which is heavier than air. It represses the respiratory system, eventually causing death by asphyxiation. At low concentrations it will cause headaches and sweating followed by a loss of consciousness. The greatest hazard occurs in confined spaces, particularly where the gas is produced as a by-product.

Carbon monoxide is a colourless, tasteless and odourless gas which makes it impossible to detect without special measuring equipment. As explained earlier, carbon monoxide enters the blood (red cells) more readily than oxygen and restricts the supply of oxygen to vital organs. At low concentrations in the blood (less than 5%), headaches and breathlessness occur, while at higher concentrations unconsciousness and death will result. The most common occurrence of carbon monoxide is as an exhaust gas either from a vehicle or a heating system. In either case, it is caused by inefficient combustion and, possibly, poor maintenance.

Carbon monoxide exposure may be prevented by ensuring that any work carried out in relation to gas appliances in domestic or commercial premises is undertaken by a Gas Safe registered engineer, competent in that area of work, and that there is enough fresh air in the room containing a gas appliance. In addition the HSE recommends the use of audible carbon monoxide (CO) alarms as a useful back-up precaution.

All gas workers must be signed up to the **Gas Safe Register**. This register replaces the requirement for all gas workers to be registered with CORGI and the scheme is overseen by the HSE. Consumers and landlords should check whether gas workers are Gas Safe registered since the failure to check that an installer is registered under the **Gas Safe Scheme** may result in a breach of the Building Regulations.

Employers and landlords should ensure their appliances are serviced regularly by an approved and competent engineer. Registered engineers can be identified by the display of a new yellow Gas Safe Register logo, and are required to carry a Gas Safe Register identification card with their own unique licence number.

There have been cases where gas leaks, electricity or water faults have developed in buildings constructed with timber frames as a result of the frame shrinking.

thereby placing excessive weight on these services. Shrinkage usually only takes place with new wood, and within its first year of use.

Diesel engine exhaust emissions* have been classified as carcinogenic by experts from the World Health Organisation (WHO). The International Agency for Research on Cancer (IARC) found sufficient evidence that exposure to diesel exhausts is associated with an increased risk of lung cancer. They also noted limited evidence that exposure could lead to an increased risk of bladder cancer. The classification follows the findings in a US study of occupational exposure to such emissions in underground miners, which showed an increased risk of death from lung cancer in exposed workers. Exposure to these particulates may also aggravate other respiratory diseases such as asthma.

Isocyanates* are volatile organic compounds widely used in industry for products such as printing inks, adhesives, and two-pack paints (particularly in vehicle body shops) and in the manufacture of plastics (polyurethane products). They are irritants and sensitisers. Inflammation of the nasal passages, the throat and bronchitis are typical reactions to many isocyanates. When a person becomes sensitised to an isocyanate, very small amounts of the substance often provoke a serious reaction similar to an extreme asthma attack. Isocyanates also present a health hazard to fire-fighters. They are subject to a workplace exposure limit (WEL) and respiratory protective equipment (RPE) should be worn.

Lead* is a heavy, soft and easily worked metal. It is used in many industries but is most commonly associated with plumbing and roofing work. Over 300,000 tonnes of lead are used annually in the UK of which 80% is used in the manufacture of lead-acid batteries and 6% is extruded into sheets for use in construction. The toxicity of lead affects nerve conduction and red blood cell production. Symptoms include abdominal pains, muscular weakness and tiredness. Inhalation is the most common means for the entry of lead into the body. From the lungs, lead enters the bloodstream and is distributed throughout the body. Lead enters the body normally by inhalation but can also enter by ingestion and skin contact. The main targets for lead are the spinal cord and the brain, the blood and blood production. The effects are normally chronic and develop as the quantity of lead builds up. Headaches and nausea are the early symptoms followed by anaemia, muscle weakening and (eventually) coma. Regular blood tests are a legal and sensible requirement as are good ventilation and the use of appropriate personal protective equipment. High personal hygiene standards and adequate welfare (washing) facilities are essential and must be used before smoking or food is consumed. The reduction in the use of leaded petrol was an acknowledgement of the health hazard represented by lead in the air. Lead is covered by

its own set of regulations – the Control of Lead at Work Regulations (summarised in Chapter 15). These Regulations require risk assessments to be undertaken and engineering controls to be in place. They also recognise that lead can be transferred to an unborn child through the placenta and, therefore, offer additional protection to women of reproductive capacity. Medical surveillance, in the form of a blood test of all employees who come into contact with lead operations, is required by the Regulations. Such tests should take place at least once a year. Regular health surveillance of lead workers by a medical practitioner is required by these Regulations.

Silica is the main component of most rocks and is a crystalline substance made of silicon and oxygen. It occurs in quartz (found in granite), sand and flint. Harm is caused by the inhalation of silica dust, which can lead to silicosis (acute and chronic), fibrosis and pneumoconiosis. The dust which causes the most harm is respirable dust which becomes trapped in the alveoli. This type of dust is sharp and very hard and, probably, causes wounding and scarring of lung tissue. As silicosis develops, breathing becomes more and more difficult and eventually, as it reaches its advanced stage, lung and heart failure occur. It has also been noted that silicosis can result in the development of tuberculosis as a further complication. Hard rock miners, quarrymen, stone and pottery workers are most at risk. Health surveillance is recommended for workers in these occupations at initial employment and at subsequent regular intervals. Prevention is best achieved by the use of good dust extraction systems and respiratory protective equipment. Over 100 enforcement notices were served in 2009/10 on silica-dust related issues compared to 13 in 2008/09.

Silica is commonly produced during construction activities. Such activities which can expose workers and members of the public to silica dust include:

- ▶ cutting building blocks and other stone masonry work;
- ▶ cutting and/or drilling paving slabs and concrete paths;
- ▶ demolition work;
- ▶ sand blasting of buildings;
- ▶ tunnelling.

In general, the use of power tools to cut or dress stone and other silica-containing materials will lead to very high exposure levels while the work is occurring. In most cases, exposure levels are in excess of workplace exposure limits (WELs) by factors greater than 2 and in some cases as high as 13. In response to the growing evidence of ill-health effects of silica inhalation, the HSE revised the WEL down from 0.3 mg/m³ to 0.1 mg/m³.

The HSE has recently recommended that compressed air is not used to remove dust due to the possibility of dust inhalation. There is also a risk of compressed air entering the operator's bloodstream, which can

result in death. Eye injury including blindness can also occur if dust particles bounce back at the operator. The inhalation of very fine silica dust can lead to the development of silicosis. The HSE has produced a detailed information sheet on silica – CIS No 36 (Rev 1).

In addition to silica, there are three hazardous substances that are particularly relevant to construction activities – cement dust and wet cement, wood dust and the biological hazard tetanus. Respiratory protective equipment (RPE), usually in the form of a mask, will normally be needed for high-risk tasks such as:

- ▶ using a cut-off saw, grinder or wall chaser on material containing silica;
- ▶ using powered cross-cut saws and sanders on hardwood, red cedar or MDF;
- ▶ sanding softwood in an enclosed space.

A filtering face piece FFP3 is the most advisable type of mask to use when high dust levels, silica or wood dust is produced. There are also filtering face pieces FFP1 and FFP2 available but these provide less respiratory protection than a properly fitting FFP3 device.

Cement dust and wet cement is important in construction and is also a hazardous substance. Contact with wet cement can cause serious burns or ulcers which will take several months to heal and may need a skin graft. Dermatitis, both irritant and allergic, can be caused by skin contact with either wet cement or cement powder. Allergic dermatitis is caused by an allergic reaction to hexavalent chromium (chromate) which is present in cement. Cement powder can also cause inflammation and irritation of the eye, irritation of the nose and throat, and, possibly, chronic lung problems. Research has shown that between 5% and 10% of construction workers are probably allergic to cement. And plasterers, concreters and bricklayers or masons are particularly at risk. A plasterer, who knelt in wet cement for 5 hours while working, required skin grafts to his legs.



Figure 13.19 Wet concrete or cement can cause serious dermatitis

Manual handling of wet cement or cement bags lead to musculoskeletal health problems and bags weighing more than 25 kg should not be lifted by a single worker. PPE in the form of gloves, overalls, long sleeves and full-length trousers and waterproof boots must be worn on all occasions. If the atmosphere is dusty, goggles and respiratory protection equipment must be worn. An important factor in the possibility of allergic dermatitis occurring is the sensitivity of the worker to the chromate in the cement and the existing condition of the skin including cuts and abrasions. Finally, adequate welfare facilities are essential so that workers can wash their hands at the end of the job and before eating, drinking or using the toilet. If cement is on the skin for long periods without being washed off, the risk of an allergic reaction to hexavalent chromium increases.

A 2005 amendment to the COSHH Regulations provides for the supply of cement which has a concentration of less than 2 parts per million of chromium VI. This measure is designed to prevent allergic contact dermatitis where wet cement comes into contact with the skin. However, since the strong alkalinity of cement will remain, it still the potential for skin burns.

The Approved Code of Practice (ACoP) gives useful advice on possible control measures by offering routes for employers to comply with the amended COSHH Regulations. They can either use the general advice given in 'The technical basis for COSHH essentials: Easy steps to control chemicals (HSE Report ISBN 978 0 7176 2434 8)' or design a solution themselves with the help of competent advice. In the event, the controls should be proportionate to the health risk. The Regulations stress the need to provide adequate washing, changing, eating and drinking facilities.

Wood dust can be hazardous, particularly when it is hard wood dust which is known, in rare cases, to lead to nasal cancer. Composite boards, such as **medium-density fibreboard (MDF)**, are hazardous due to the resin bonding material used, which can also be carcinogenic. There are three types of wood based boards available: laminated board, particle board and fibreboard. The resins used to bond the fibreboard together contain formaldehyde (usually urea formaldehyde). It is generally recognised that formaldehyde is 'probably carcinogenic to humans' and is subject to a WEL. At low exposure levels, it can cause irritation to the eyes, nose and throat and can lead to dermatitis, asthma and rhinitis. The main problems are most likely to occur when the MDF is being machined and dust is produced. A suitable risk assessment should be made and gloves and appropriate masks should always be worn when machining MDF. However, it is important to stress that safer materials are available which do not contain formaldehyde and these should be considered for use in the first instance.

is produced whenever wood materials are particularly sawed, sanded, bagged as dust extraction units or during cleaning operations, compressed air is used. The main hazards with all wood dusts are skin disorders, nasal such as rhinitis, and asthma. There is also a fire and explosion. A COSHH assessment to show whether the particular wood dust is. When the wood dust is created inside a workshop, a well-designed extraction is essential. PPE in the form of gloves, suitable protective equipment, overalls and eye may also be necessary as a result of the. Finally, good washing and welfare facilities are essential.

is a serious, sometimes fatal, disease caused by a bacterium that lives in the soil. It usually enters the body through a wound from an infected object, such as a nail, wood splinter or thorn. On entering the body it produces a powerful toxin which attacks the muscles that supply muscle tissue. It is commonly known as lockjaw because after an incubation period of approximately a week stiffness around the jaw area. Later the disease spreads to other muscles including the breathing system and this can be fatal. The disease has been well controlled with anti-tetanus vaccination and it is important that all construction workers are so immunised. Booster shots should be had every few years. Any flesh wound should be roughly cleaned immediately and an anti-septic applied.

Leptospirosis and Weil's disease is caused by a bacterium found in the urine of rats. In humans, the kidneys and liver are attacked causing high temperatures, headaches followed by jaundice and, in up to 10% of cases, it can be fatal. It enters the body either through the skin or by ingestion. The most common source is contaminated water in a river, sewer or ditch. Workers, such as canal or sewer workers, are most at risk. Leptospirosis is always a risk where rats are present, particularly if the associated environment is damp. Good, impervious protective clothing, particularly Wellington boots, is essential in these situations and covering of any skin wounds. For workers who are frequently in high-risk environments (sewer workers), immunisation with a vaccine may be the best protection. Weil's disease is, strictly, a severe form of leptospirosis. The symptoms of leptospirosis are similar to influenza but those for Weil's disease are anaemia, nose bleeds and jaundice. While the most common source of infection is from the urine of rats, Weil's disease has also been found in other animals, such as cattle; therefore, farm and veterinary workers may also be at risk.

Legionella is an airborne bacterium and is found in a variety of water sources. It produces a form of pneumonia caused by the bacteria penetrating to the alveoli in the lungs. This disease is known

as Legionnaires' disease, named after the first documented outbreak at a State Convention of the American Legion held at Pennsylvania in 1976. During this outbreak, 200 men were affected, of whom 29 died. That outbreak and many subsequent ones were attributed to air-conditioning systems. Legionnaires' disease is a potentially fatal form of pneumonia and everyone is susceptible to infection. However, some people are at higher risk, including:

- ▶ people over 45 years of age;
- ▶ smokers and heavy drinkers;
- ▶ people suffering from chronic respiratory or kidney disease;
- ▶ anyone with an impaired immune system.

The symptoms are a high temperature, fever and chills, cough, muscle pains and headache. In a severe case, there may also be pneumonia, and occasionally diarrhoea, as well as signs of mental confusion. Legionnaires' disease is not known to spread from person to person.

The legionella bacterium cannot survive at temperatures above 60°C but grows between 20°C and 45°C, being most virulent at 37°C. It also requires food in the form of algae and other bacteria. Control of the bacteria involves the avoidance of water temperatures between 20°C and 45°C, avoidance of water stagnation and the build-up of algae and sediments and the use of suitable water-treatment chemicals. This work is often done by a specialist contractor.

The most common systems at risk from the bacterium are:

- ▶ water systems incorporating a cooling tower;
- ▶ water systems incorporating an evaporative condenser;
- ▶ hot and cold water systems and other plant where the water temperature may exceed 20°C.

An Approved Code of Practice (*Legionnaires' disease – The control of legionella bacteria in water systems* – LE) is available from the HSE. The latest edition of the ACOP and guidance contains revisions to simplify and clarify the text. The main changes are removing Part 2, the technical guidance, which is published separately in HSG274, and giving the following issues ACOP status:

- ▶ risk assessment;
- ▶ the specific role of an appointed competent person known as the 'responsible person';
- ▶ the control scheme;
- ▶ review of control measures;
- ▶ duties and responsibilities of those involved in the supply of water systems.

Where plant at risk of the development of legionella exists, the following is required:

- ▶ a written 'suitable and sufficient' risk assessment;
- ▶ the preparation and implementation of a written control scheme involving the treatment, cleaning and maintenance of the system;

- ▶ appointment of a named person with responsibility for the management of the control scheme;
- ▶ the monitoring of the system by a competent person;
- ▶ record keeping and the review of procedures developed within the control scheme.

The code of practice also covers the design and construction of hot and cold water systems and cleaning and disinfection guidance. There have been several cases of members of the public becoming infected from a contaminated cooling tower situated on the roof of a building. It is required that all cooling towers are registered with the local authority. People are more susceptible to the disease if they are older or weakened by some other illness. It is, therefore, important that residential and nursing homes and hospitals are particularly vigilant. The most common source of isolated outbreaks of legionella is showerheads, particularly when they remain unused for a period of time. Showerheads should be cleaned and descaled at least every three months.

All warm water systems should be checked annually by a competent person. However, there are some simple checks that can be made as follows:

- ▶ each month, check that the temperature of water from hot water taps reaches 50°C after the water has run for 1 minute;
- ▶ each month, check that the temperature of water from cold water taps is below 20°C after the water has run for 2 minutes;
- ▶ each quarter, clean and descale shower heads and hoses;
- ▶ each week, purge little used water outlets.

Hepatitis* is a disease of the liver and can cause high temperatures, nausea and jaundice. It can be caused by hazardous substances (some organic solvents) or by a virus. The virus can be transmitted from infected faeces (hepatitis A) or by infected blood (hepatitis B and C). The normal precautions include good personal hygiene, particularly when handling food and in the use of blood products. Hospital workers who come into contact with blood products are at risk of hepatitis as are drug addicts who share needles. It is also important that workers at risk regularly wash their hands and wear protective disposable gloves.

Hepatitis is an example of a **blood-borne virus**. Another example is human immunodeficiency virus (HIV) which causes acquired immune deficiency syndrome (AIDS), affecting the immune system of the body. Some people carry a blood-borne virus in their blood which may cause disease in some people and few or no symptoms in others. The virus can spread to another person, whether the carrier of the virus is ill or not.

In the workplace, direct exposure can happen through accidental contamination by a sharp instrument or through contamination of open wounds, skin abrasions

or through splashes to the eyes, nose or mouth. In occupations where there is a risk of exposure to blood-borne viruses, the following measures to prevent and control risks are recommended by the HSE:

- ▶ prohibit eating, drinking, smoking and the use of cosmetics in working areas where there is a risk of contamination;
- ▶ prevent puncture wounds, cuts and abrasions, especially in the presence of blood and body fluids;
- ▶ when possible avoid use of, or exposure to, sharp objects such as needles, glass or metal or if unavoidable take care in handling and disposal;
- ▶ consider the use of devices incorporating safety features, such as safer needle devices and retractable scissors;
- ▶ cover all breaks in exposed skin by using waterproof dressings and suitable gloves;
- ▶ protect the eyes and mouth by using a visor, safety spectacles and a mask, where splashes are likely to occur;
- ▶ avoid contamination by using water-resistant protective clothing;
- ▶ wear rubber boots or plastic disposable overshoes when the floor or ground is likely to be contaminated;
- ▶ use good basic hygiene practices, such as hand washing;
- ▶ control contamination of surfaces by containing spills and using appropriate decontamination procedures;
- ▶ dispose of contaminated waste safely.

The risk of first-aiders being infected with a blood-borne virus while carrying out their duties is small. There has been no recorded case of HIV or hepatitis B being passed on during mouth-to-mouth resuscitation. The following precautions are recommended by the HSE to reduce the risk of infection:

- ▶ cover any cuts or grazes on your skin with a waterproof dressing;
- ▶ wear suitable disposable gloves when dealing with blood or any other body fluids;
- ▶ use suitable eye protection and a disposable plastic apron where splashing is possible;
- ▶ use devices such as face shields when giving mouth-to-mouth resuscitation, but only if training in their use has been received; and
- ▶ wash hands after each procedure.

13.6 Safe handling and storage of waste

Work-related deaths in the waste management industry are ten times the national average. Accident rates in the industry are four times the national average. The statutory duty of care for the management of waste derives from Part 2 of the Environmental Protection Act 1990 (EPA). The principal requirements are as follows:

- to handle waste so as to prevent any unauthorised escape into the environment;
- to pass waste only to an authorised person as defined by the EPA;
- to ensure that a written description accompanies all waste. The Environmental Protection (Duty of Care) Regulations 1991 requires holders or producers of waste to complete a 'Transfer Note' giving full details of the type and quantity of waste for collection and disposal. Copies of the note should be kept for at least 2 years;
- to ensure that no person commits an offence under the Act.



Figure 13.20 Commercial waste collection

The EPA is concerned with controlled waste.

Controlled waste comprises household, industrial or commercial waste. It is a criminal offence to deposit controlled waste without an environmental permit and/or in a manner likely to cause environmental pollution or harm to human health.

The EPA also covers **hazardous waste and spillage**. Hazardous waste can only be disposed of using special arrangements. There are two categories of hazardous waste: absolute hazardous waste, such as hydrochloric acid, fuel, oil or diesel; or minor hazardous waste, such as sawdust, shavings, cuttings, wood particle board and veneer containing dangerous substances. If waste does fall into these categories, it needs to be handled, stored, transported and disposed of appropriately. The EPA imposes a legal duty of care to ensure that waste is not illegally disposed of, or dealt with without an Environmental Permit or Registered Exemption (see Chapter 15 for more information on these topics).

The waste must be stored securely and safely in sealed waterproof containers with clear labelling and written instructions for storage and disposal to ensure that the environment is protected. It must be regularly checked for leaks, deteriorating containers, or other potential risks. It is essential to carry out a risk assessment to identify the risks associated with handling and storing hazardous waste.

These substances are sometimes life threatening (toxic, corrosive or carcinogenic) or highly flammable. Clinical waste falls within this category. A consignment note system accompanies this waste at all the stages to its final destination. Before hazardous waste is removed from the originating premises, a contract should be in place with a licensed carrier.

The Hazardous Waste Regulations, with the exclusion of Scotland, replace the Special Waste Regulations and cover many more substances; for example, computer monitors, fluorescent tubes, end-of-life vehicles and television sets. Hazardous waste is waste which can cause damage to the environment or to human health. The hazardous properties of waste covered by these Regulations are listed in Appendix 13.2 and producers of such waste may need to notify the Environment Agency. The Regulations seek to ensure that hazardous waste is safely managed and its movement is documented. The following points are important for construction sites:

- ▶ Sites that produce more than 200 kg of hazardous waste each year for removal, treatment or disposal must register with the Environment Agency.
- ▶ Different types of hazardous waste must not be mixed.
- ▶ Producers must maintain registers of their hazardous wastes.

13.6.1 Waste disposal

The collection and removal of waste from a workplace is normally accomplished using a skip. Every year, activities involving the movement of skips and containers cause death and serious injury. The hazards include:

- ▶ being struck by vehicles;
- ▶ falling and slipping;
- ▶ failures of lifting equipment;
- ▶ striking overhead cables/obstructions;
- ▶ vehicle overturns;
- ▶ runaway vehicles.

The skip should be located on firm, level ground away from the main construction work, particularly excavation work. This will allow clear access to the skip for filling and removal from site. On arrival at site, the integrity of the skip should be checked. It should be filled either by chute or by mechanical means unless items can be placed in by hand. Skips should not be overfilled and be netted or sheeted over when they are full. Any hazardous waste should be segregated from controlled waste.

Waste skip selection should be made during the site planning process. The selected skip must be suitable for the particular job. The following points should be considered:

- ▶ sufficient strength to cope with its load;
- ▶ stability while being filled;
- ▶ a reasonable uniform load distribution within the skip at all times;

- ▶ the immediate removal of any damaged skip from service and the skip inspected after repair before it is used again;
- ▶ sufficient space around the skip to work safely at all times;
- ▶ the skip should be resting on firm level ground;
- ▶ the skip should never be overloaded or overfilled;
- ▶ there must be sufficient headroom for the safe removal of the skip when it is filled.



Figure 13.21 A designated waste collection area with two types of skip commonly used for waste collection. Heavy materials would be transported in the smaller skip. Sizes of skip range from about 4 cu metres (small skip shown) to about 35 cu metres (large skip shown)

There are hazards present during the movement of a loaded skip from the ground to the back of a skip loader vehicle. Entanglement with the vehicle lifting mechanisms, such as the hydraulic arms and lifting chains, is a major hazard. Other hazards include contact by the skip with overhead obstructions, movement of the skip contents and skip overload leading to mechanical or structural failure. Slip hazards may be present due to spillages from the skip and the skip contents could be contaminated with biological material, asbestos or syringes. Passing traffic during the loading operation may also present a hazard.

The control measures for these hazards include the use of outriggers to increase the stability of the loader vehicle and the provision of steps for the driver to alight from the cab or the vehicle flatbed. The contents of the skip should be secured using netting or tarpaulin. Adhering to the safe working loads of the skip and lifting equipment and the use of a banksman during the lifting process are additional controls. The area around the vehicle may need to be cordoned off to protect passing pedestrians and road traffic. All workers concerned with the operation should wear suitable PPE, such as high visibility jackets, gloves and suitable footwear. Finally, all lifting equipment, including chains and shackles, must be subject to a periodic statutory examination.

13.6.2 Waste management

Some form of training may be required to ensure that employees segregate hazardous and non-hazardous

wastes on site and fully understand the risks and necessary safety precautions which must be taken. Personal protective equipment, including overalls, gloves and eye protection, must be provided and used. The storage site should be protected against trespassers, fire and adverse weather conditions. If flammable or combustible wastes are being stored, adequate fire protection systems must be in place. Finally, in the case of liquid wastes, any drains must be protected and bunds used to restrict spreading of substance as a result of spills.

A hierarchy for the management of waste streams has been recommended by the Environment Agency:

1. Prevention – by changing the process so that the waste is not produced (e.g. substitution of particular material).
2. Reduction – by improving the efficiency of the process (e.g. better machine maintenance).
3. Reuse – by recycling the waste back into the process (e.g. using reground waste plastic product as a feed for new products).
4. Recovery – by releasing energy through the combustion, recycling or composting of waste (e.g. the incineration of combustible waste to heat a building).
5. Responsible disposal – by disposal in accordance with regulatory requirements.

13.6.3 Other waste issues

In 1998, land disposal accounted for approximately 58% of waste disposal, 26% was recycled and the remainder was incinerated with some of the energy recovered as heat. The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 placed legal obligations on employers to reduce the packaging waste by either recycling or recovery as energy (normally as heat from an incinerator attached to a district heating system). A series of targets have been stipulated which will reduce the amount of waste progressively over the years. These Regulations are enforced by the Environment Agency which has powers of prosecution in the event of non-compliance. The UK recycled almost two-thirds of all packaging produced in 2008.

The Landfill (England and Wales) Regulations 2002 are part of the government's drive to encourage recycling and reduce the amount of rubbish sent to landfill sites, and this means that companies now have to either recycle or treat their waste before it is taken to landfill. The new rules have already come into force in Scotland.

The main changes are that liquid wastes are now banned from landfill and other waste must be treated before it can be passed into landfill. Businesses now need to demonstrate that their waste has been treated in either a physical, thermal, chemical or

ological process. One major environmental problem is that of contaminated land. Contaminated land is defined in the Environmental Protection Act and is produced by leakage, accidental spillage and uncontrolled waste disposal. The contaminator of the land has the primary responsibility and liability to clean up the contamination. If the contaminator is unknown, the current owner of the land has the responsibility. If no current owner can be found then the local authority becomes responsible for the remediation.

There is more information on the EPA, the Integrated Pollution Prevention and Control (IPPC) and waste disposal in Chapter 15. The Environment Agency has similar powers following the introduction of the Waste Electrical and Electronic Equipment (WEEE) Directive, the Restrictions of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS) and the End of Life Vehicle (ELV) Directive. The aim of the WEEE Directive is to minimise the environmental impact of electrical and electronic equipment both during their lifetime and when they are discarded. All electrical and electronic equipment must be returned to the retailer from its end user and reused or reprocessed by the manufacturer. Manufacturers must register with the Environment Agency, who will advise on these obligations. The WEEE Regulations have been amended so that producer-compliance schemes report their activities in a more precise way (by providing evidence of recycling in kilograms instead of tonnes). It is hoped that this will reduce the delays in recycling and lead to the recycling of smaller amounts at more frequent intervals. The European Commission has recently proposed changes to both WEEE and RoHS. On WEEE, a major proposal is to increase the amounts of electrical and electronic waste that are separately collected and recycled, while the proposals on RoHS aim for a higher level of environmental protection by revising the scope of the restrictions and the applicable substances.

There is a useful HSE Waste management and recycling website www.hse.gov.uk/waste/index.htm.



Figure 13.22 Electronic waste under WEEE

13.7 Further information

Statutory provisions

The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009

The Control of Asbestos Regulations 2012

The Control of Substances Hazardous to Health Regulations 2002

The Hazardous Waste (England and Wales) Regulations 2005

The Personal Protective Equipment at Work Regulations 1992 (as amended)

The Special Waste Amendment (Scotland) Regulations 2004

The Waste (England and Wales) Regulations 2011 as amended

Other references

Asbestos: The Survey Guide HSG 264, HSE Books, ISBN 978-0-7176-6502-0 <http://books.hse.gov.uk/hse/public/saleproduct.jsf?catalogueCode=9780717665020>

Control of Substances Hazardous to Health (fifth edition), ACoP and guidance, L5, HSE Books, ISBN 978-0-7176-2981-7 www.hse.gov.uk/pubns/priced/l5.pdf

Controlling Airborne Contaminants at Work: A Guide to Local Exhaust Ventilation, HSG258, second edition 2011, HSE Books, ISBN 978-0-7176-6415-3 www.hse.gov.uk/pubns/priced/hsg258.pdf

Managing Asbestos in Buildings: A brief guide, INDG223(rev5) 2012, HSE Books, <http://www.hse.gov.uk/pubns/indg223.pdf>

Occupational Exposure Limits, EH40/2005, HSE Books, ISBN 978-0-7176-6446-7 www.hse.gov.uk/pubns/priced/eh40.pdf

Personal Protective Equipment at Work (second edition), Personal Protective Equipment at Work Regulations 1992 (as amended), Guidance on Regulations, HSE Books, ISBN 978-0-7176-6139-3 www.hse.gov.uk/pubns/priced/l25.pdf

Respiratory Protective Equipment at Work – A Practical Guide, HSG53, third edition 2005, HSE Books, ISBN 978-0-7176-2904-6 www.hse.gov.uk/pubns/priced/hsg53.pdf

Step by Step Guide to COSHH Assessment, HSG97, second edition 2004, HSE Books, ISBN 978-0-7176-2785-1 www.hse.gov.uk/pubns/priced/hsg97.pdf

The management of asbestos in non-domestic premises, Regulation 4 of the Control of Asbestos Regulations 2006, Approved Code of Practice and guidance (L127), ISBN 978-0-7176-6209-8 www.hse.gov.uk/pubns/priced/l127.pdf

Information on the Control of Asbestos Regulations 2012 <http://www.hse.gov.uk/asbestos/regulations.htm>

13.8 Practice revision questions

- Health hazards may be present in the workplace through various chemical and biological agents.
 - Describe FOUR** chemical and **THREE** biological hazardous agents and **give** an example of each agent.
 - Explain** the term 'respirable dust' and **outline** its health effect on the human body.
- For each of the following types of hazardous substance, **give** a typical example and **outline** its primary effect on the human body:
 - irritant
 - corrosive
 - toxic
 - carcinogenic
 - mutagenic.
- Describe** the differences between acute and chronic health effects giving an example in each effect.
 - Identify TWO** types of cellular defence mechanisms that the body has as a natural defence system.
 - Identify** the factors that could affect the level of harm experienced by a worker who has been exposed to a toxic substance.
- Identify FOUR** possible routes of entry of a hazardous substance into the body **AND**, in **EACH** case, **give** an example of how an employee might be at risk of such exposure.
 - Define** the term 'target organ' within the context of occupational health.
 - Outline** the personal hygiene practices that should be followed to reduce the risk of ingestion of a hazardous substance.
- Identify** possible routes of entry of biological organisms into the body.
 - Outline** control measures that could be used to reduce the risk of infection from biological organisms.
- Identify FOUR** respiratory diseases that could be caused by exposure to dust at work.
 - Describe** the respiratory defence mechanisms of the body against atmospheric dust.
- Describe** the typical symptoms of occupational dermatitis.
 - Identify TWO** common causative agents.
 - Outline** control measures which may be taken to prevent the occurrence of occupational dermatitis.
- Outline** the issues to be considered when undertaking an assessment of health risks from hazardous substances that may be in a workplace.
- Identify** the information that should be included on a manufacturer's safety data sheet supplied with a hazardous substance.
 - Outline FOUR** sources of information that might be consulted when assessing the risk of a hazardous substance in a workplace.
- Identify** the main advantages and limitations of chemical indicator (stain detector) tubes.
 - Explain** how a dust lamp can give an indication of airborne dust levels in a workplace.
 - Outline** how a personal dust sampler is used to measure the levels of airborne dust in a workplace.
- Outline** the main purposes of occupational exposure limits (OELs).
 - Explain** the meaning of the following terms:
 - the short-term exposure limit (STEL)
 - the long-term exposure limit (LTEL)
 - the maximum permissible concentration
 - Outline** the limitations of occupational exposure limits.
- Explain** the meaning of the term 'workplace exposure limit' (WEL).
 - Identify** the two classifications of hazardous substances that require exposure to be reduced to as low a level as is reasonably practicable below the WEL.
 - Outline FOUR** actions that could be taken when a WEL has been exceeded.
- Outline** the Principles of Good Practice that will help to prevent ill-health due to exposure of workers to hazardous substances.
 - Outline** a hierarchy of control measures that could be used to implement the Principles of Good Practice for the control of exposure to hazardous substances.
- A local exhaust ventilation (LEV) system is to be installed to extract welding fume from an engineering workshop.
 - Identify** the five basic components of the system.
 - Outline** the issues that might reduce the effectiveness of the LEV system.
 - Outline** the routine maintenance that should be carried out between statutory examinations so that the ventilation system continues to operate effectively.
- Explain** the meaning of the term 'dilution ventilation'.

- (b) **Identify THREE** instances when dilution ventilation may be used in a workplace.
- (c) **Identify** the limitations to the use of dilute ventilation.
5. **Identify** the possible health effects on workers and **identify FOUR** control measures to minimise those health effects for the following hazardous substances:
- (a) solvent-based adhesives and paints
(b) wood dust
(c) glass fibres
(d) isocyanates.
6. (a) **Outline** the issues that should be considered when selecting and using personal protective equipment.
(b) **Identify** the hazards against which the following items of personal protective equipment should offer protection and **outline** the practical limitations of each item:
(i) safety gloves
(ii) safety footwear
(iii) safety goggles
(iv) safety spectacles.
17. (a) **Outline** the health and safety hazards associated with welding operations.
(b) **Outline** the factors to be considered in the selection of respiratory protective equipment for persons carrying out welding activities.
(c) **Identify** the difference between breathing apparatus and respirators.
18. (a) **Outline** the purpose of health surveillance of workers who may have come into contact with hazardous substances.
(b) **Give THREE** examples of health surveillance in the workplace.
(c) **Outline** the importance of personal hygiene in the workplace.
19. (a) **Identify TWO** respiratory diseases that may be caused by exposure to asbestos.
(b) **Identify** the **THREE** types of asbestos commonly found in buildings and **identify** the common sources of asbestos in buildings.
(c) **Outline** the control measures required before and during the removal of asbestos from a building.
20. For **EACH** of the following agents, **outline** the principal health effects **AND identify** a typical workplace situation in which a person might be exposed:
- (a) carbon monoxide
(b) legionella bacteria
(c) leptospira
(d) blood-borne viruses.
21. **Identify** the possible health hazards to which construction workers may be exposed from the following substances. In each case **give** an example of a likely source and suitable control measures:
- (a) silica dust
(b) wet cement.
22. A toxic substance has been transported by lorry to a warehouse in a number of drums. At the warehouse, one of the drums is ruptured during unloading and some of the contents are spilt on the floor.
- (a) **Outline** the main controls that should be in place to ensure the safe transport of the hazardous substance by road.
(b) **Outline** a procedure that would deal safely with the spillage.
(c) **Identify THREE** ways in which persons working near the spillage might be harmed.
23. A company produces a range of solid and liquid wastes, both hazardous and non-hazardous.
- (a) **Identify** the main hazards associated with the storage of wastes.
(b) **Outline** the required arrangements to ensure the safe storage of the wastes prior to their collection and disposal.
(c) **Outline** the issues that should be addressed by the company when developing a system for the safe collection and disposal of waste.
24. Skips are used to store solid waste materials prior to collection and disposal.
- (a) **Identify** the hazards a skip collector could be exposed to when moving a full skip from the ground onto the back of a skip loader vehicle.
(b) **Identify EIGHT** safe practices to be followed when using a skip for the collection and removal of waste from a construction site.

APPENDIX 13.1 GHS Hazard (H) Statements (Health only)

H-statement	Phrase
300	Fatal if swallowed
301	Toxic if swallowed
302	Harmful if swallowed
303	May be harmful if swallowed
304	May be fatal if swallowed and enters airways
305	May be harmful if swallowed and enters airways
310	Fatal in contact with skin
311	Toxic in contact with skin
312	Harmful in contact with skin
313	May be harmful in contact with skin
314	Causes severe burns and eye damage
315	Causes skin irritation
316	Causes mild skin irritation
317	May cause an allergic skin reaction
318	Causes serious eye damage
319	Causes serious eye irritation
320	Causes eye irritation
330	Fatal if inhaled
331	Toxic if inhaled
332	Harmful if inhaled
333	May be harmful if inhaled
334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
335	May cause respiratory irritation
336	May cause dizziness or drowsiness
340	May cause genetic defects (route if relevant)
341	Suspected of causing genetic defects (route if relevant)
350	May cause cancer (route if relevant)
351	Suspected of causing cancer (route if relevant)
360	May damage fertility or the unborn child (effect if known, route if relevant)
361	Suspected of damaging fertility or the unborn child (effect if known, route if relevant)
362	May cause harm to breast-fed children
370	Causes damage to organs (organ if known, route if relevant)
371	May cause damage to organs (organ if known, route if relevant)
372	Causes damage to organs through prolonged or repeated exposure (organ if known, route if relevant)
373	May cause damage to organs through prolonged or repeated exposure (organ if known, route if relevant)
EU66	Repeated exposure may cause skin dryness or cracking
EU70	Toxic by eye contact
EU71	Corrosive to the respiratory tract

APPENDIX 13.2: Hazardous properties of waste (as listed in the Hazardous Waste (England and Wales) Regulations 2005)

	Hazard	Description.
H1	Explosive	Substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.
H2	Oxidising	Substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.
H3-A	Highly flammable	<ul style="list-style-type: none"> ▶ liquid substances and preparations having a flash point below 21°C (including extremely flammable liquids), or ▶ substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or ▶ solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or ▶ gaseous substances and preparations which are flammable in air at normal pressure, or ▶ substances and preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities
H3-B	Flammable	Liquid substances and preparations having a flash point equal to or greater than 21°C and less than or equal to 55°C.
H4	Irritant	Non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
H5	Harmful	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
H6	Toxic	Substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
H7	Carcinogenic	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
H8	Corrosive	Substances and preparations which may destroy living tissue on contact.
H9	Infectious	Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in humans or other living organisms.
H10	Teratogenic	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence.
H11	Mutagenic	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.
H12		Substances and preparations which release toxic or very toxic gases in contact with water, air or an acid.
H13		Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.
H14	Ecotoxic	Substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment.

Physical and psychological health hazards and risk control

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This chapter covers the following NEBOSH learning objectives:

1. Outline the health effects associated with exposure to noise and appropriate control measures
2. Outline the health effects associated with exposure to vibration and appropriate control measures
3. Outline the health effects associated with ionising and non-ionising radiation and appropriate control measures
4. Outline the meaning, causes and effects of work-related stress and appropriate control measures

Introduction

Occupational health is concerned with physical and psychological hazards as well as chemical and biological hazards. The physical occupational hazards have been well known for many years, and recent emphasis has been on the development of lower risk workplace environments. Physical hazards include topics such as electricity, display screen equipment (DSE) and manual handling, which were covered in earlier chapters; and noise, vibration and radiation, which are discussed in this chapter.

However, it is only really in the last 20 years that psychological hazards have been included among the occupational health hazards faced by many workers. This is now the most rapidly expanding area of occupational health, and includes topics such as mental health and workplace stress (as well as violence to staff and substance abuse covered in Chapter 7).

14.1 Noise

14.1.1 Introduction

There was considerable concern for many years over the increasing cases of occupational deafness, and this led to the introduction of the Control of Noise at Work Regulations in 1989 and the revised Noise at Work Regulations in 2005. The HSE has estimated that an additional 1.1 million workers will be covered by the revised Regulations. These Regulations, which are summarised in Chapter 15, require the employer to:

- ▶ assess noise levels and keep records;
- ▶ reduce the risks from noise exposure by using engineering controls in the first instance and the provision and maintenance of hearing protection as a last resort;
- ▶ provide employees with information and training;
- ▶ if a manufacturer or supplier of equipment, provide relevant noise data on that equipment (particularly if any of the three action levels is likely to be reached).

Many occupations have potential noise problems including construction, manufacturing, entertainment, the uniformed services and call centres.

The main purpose of the Noise Regulations is to control noise levels rather than measuring them. This involves the better design of machines, equipment and work processes, and ensuring that personal protective

equipment is correctly worn and employees are given adequate training and health surveillance.

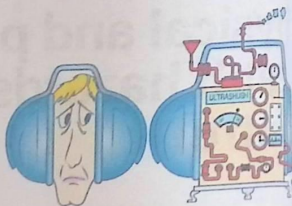


Figure 14.1 Better to control noise at source than ear protection

Sound is transmitted through the air by sound waves which are produced by vibrating objects. The vibrations cause a pressure wave which can be detected by a receiver, such as a microphone or the human ear. The ear may detect vibrations which vary from 20 to 20,000 (typically 50–16,000) cycles each second (or Hertz). Sound travels through air at a finite speed (342 m/s at 20°C and sea level). The existence of this speed is shown by the time lag between lightning and thunder during a thunderstorm. Noise normally describes loud, sudden, harsh or irritating sounds although noise is defined as any audible sound.

Noise may be transmitted directly through the air, by reflection from surrounding walls or buildings or through the structure of a floor or building. In construction work, the noise and vibrations from a pneumatic drill will be transmitted from the drill itself from the ground being drilled and from the walls of surrounding buildings.

14.1.2 Health effects of noise

The human ear

There are three sections of the ear – the outer (or external) ear, the middle ear and the inner (or internal) ear. The sound pressure wave passes into and through the outer ear and strikes the eardrum causing it to vibrate. The eardrum is situated approximately 25 mm inside the head. The vibration of the eardrum causes proportional movement of three interconnected small bones in the middle ear, thus passing the sound to the cochlea situated in the inner ear.

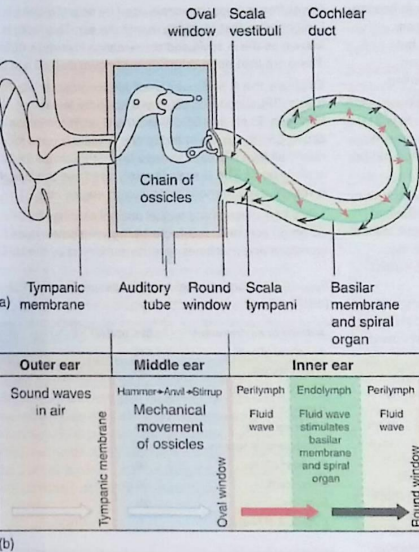


Figure 14.2 Passage of sound waves. (a) the ear with cochlea uncoiled; (b) summary of transmission.

Within the cochlea the sound is transmitted to a fluid causing it to vibrate. The motion of the fluid induces a membrane to vibrate which, in turn, causes hair cells attached to the membrane to bend. The movement of the hair cells causes a minute electrical impulse to be transmitted to the brain along the auditory nerve. Those hairs nearest to the middle ear respond to high frequency, while those at the tip of the cochlea respond to lower frequencies. (**Frequency** is the number of occurrences of a repeating event over a given period of time and is measured in Hertz (Hz).)

There are about 30,000 hair cells within the ear and noise-induced hearing loss causes irreversible damage to these hair cells.

Ill-health effects of noise

Noise can lead to ear damage on a temporary (acute) or permanent (chronic) basis.

There are three principal **acute** effects:

- ▶ **temporary threshold shift** – caused by short excessive noise exposures and affects the cochlea by reducing the flow of nerve impulses to the brain.

The result is a slight deafness, which is reversible when the noise is removed;

- ▶ **tinnitus** – a ringing in the ears caused by an intense and sustained high noise level. It is caused by the over-stimulation of the hair cells. The ringing sensation continues for up to 24 hours after the noise has ceased;
- ▶ **acute acoustic trauma** – caused by a very loud noise such as an explosion. It affects either the eardrum or the bones in the middle ear and is usually reversible. Severe explosive sounds can permanently damage the eardrum.

Occupational noise can also lead to one of the following three **chronic** hearing effects:

- ▶ **noise-induced hearing loss** – results from permanent damage to the cochlear hair cells. It affects the ability to hear speech clearly but the ability to hear is not lost completely;
- ▶ **permanent threshold shift** – this results from prolonged exposure to loud noise and is irreversible due to the permanent reduction in nerve impulses to the brain. This shift is most marked at the 4000

H_z frequency, which can lead to difficulty in hearing certain consonants and some female voices;

- ▶ **tinnitus** – is the same as the acute form but becomes permanent. It is a very unpleasant condition, which can develop without warning.

It is important to note that, if the level of noise exposure remains unchanged, noise-induced hearing loss will lead to a permanent threshold shift affecting an increasing number of frequencies. The hearing loss caused can be temporary or permanent.

- ▶ **Temporary deafness** can occur after leaving a noisy place. Hearing usually recovers within a couple of hours. This is a sign that continued exposure to loud noise could permanently damage your hearing;
- ▶ **Sudden extremely loud noise** can cause instant damage; and
- ▶ **Repeated exposure** causes gradual hearing loss due to repeated exposure. This is more common and it can take years for a worker to realise just how deaf they have become.

Presbycusis is the term used for hearing loss in older people which may have been exacerbated by occupational noise earlier in their lives.

14.1.3 Noise assessments

The Control of Noise at Work Regulations specify action levels at which the hearing of employees must be protected. The conclusion as to whether any of those levels has been breached is reached after an assessment of noise levels has been made. However, before noise assessment can be discussed, noise measurement and the statutory action levels must be described.

Noise measurement

Sound intensity is measured by a unit known as a Pascal ($p_a = \text{N/m}^2$), which is a unit of pressure similar to that used when inflating a tyre. If noise was measured in this way, a large scale of numbers would be required ranging from 1 at one end to 1 million at the other. The sound pressure level (SPL) is a more convenient scale because:

- ▶ it compresses the size of the scale by using a logarithmic scale to the base 10,
- ▶ it measures the ratio of the measured pressure, p , to a reference standard pressure, p_0 , which is the pressure at the threshold of hearing (2×10^{-5} Pa).

The unit is called a decibel (dB) and is defined as:

$$\text{SPL} = 20 \log_{10} (p/p_0) \text{ dB}$$

It is important to note that since a logarithmic scale to the base 10 is used, each increase of 3 dB is a doubling in the sound intensity. Thus, if a sound reading changes from 75 dB to 81 dB, the sound intensity or loudness has increased by four times.

Finally, as the human ear tends to distort its sensitivity to the sound it receives by being less sensitive to

lower frequencies, the scale used by sound meters is weighted so that readings mimic the ear. This is known as the A scale and the readings are known as dB(A). There are also three other scales known as B, C and D.

Originally the A scale was used for sound pressure levels (SPLs) up to 55 dB, the B scale for levels between 55 dB and 85 dB and the C scale for levels above 85 dB. However today, the A scale is used for nearly all levels except for very high SPLs where the C scale is used. The B scale is rarely used and the D scale is mainly used to monitor jet aircraft engine noise.

Table 14.1 gives some typical decibel readings for common activities and Table 14.2 gives some typical decibel readings for woodworking machines recently published by the HSE.

Table 14.1 Some typical sound pressure level (dB(A) values)

Activity or environment	SPL [dB(A)]
Threshold of pain	140
Pneumatic drill	125
Pop group or disco	110
Heavy lorry	93
Street traffic	85
Conversational speech	65
Business office	60
Living room	40
Bedroom	25
Threshold of hearing	0

Noise is measured using a sound level meter which reads SPLs in dB(A) and the **peak sound pressure** (p_{peak}), which is the highest noise level reached by the sound. There are two basic types of sound level meter – integrated and direct reading meters. Meters which integrate the reading provide an average reading over a particular time period, which is an essential technique when there are large variations in sound levels. The value is known as the **continuous equivalent sound level** (L_{eq}), which is normally measured over an 8-hour period.

Table 14.2 Typical noise levels at woodworking machines

Machine	Noise level [dB(A)]
Beam panel saws and sanding machines	97
Boring machines	98
Band re-saws, panel planers and vertical spindle moulders	100
Portable woodworking tools	101
Bench saws and multiple rip saws	102
High-speed routers and moulders	103
Thicknessers	104
Edge banders and multi-cutter moulding machines	105
Double-end tenoners	107

Direct reading devices, which tend to be much cheaper, can be used successfully when the noise levels are continuous at a near constant value.

Another important noise measurement is the **daily personal exposure level** of the worker, $L_{EP,d}$, which is measured over an 8-hour working day. Hence, if a person was exposed to 87 dB(A) over 4 hours, this would equate to an $L_{EP,d}$ of 84 dB(A) since a reduction of 3 dB(A) represents one-half of the noise dose.

The HSE Guidance on the Control of Noise at Work Regulations, L108, offers some very useful advice on the implementation of the Regulations and should be read by anyone who suspects that they have a noise problem at work. The guidance covers 'equipment and procedures for noise surveys' and contains a noise exposure ready reckoner which can be used to evaluate $L_{EP,d}$ when the noise occurs during several short intervals and/or at several different levels during the 8-hour period.

A survey by the Chartered Institute of Environmental Health (CIEH) has found that up to 50% of pub and club owners are failing to protect their staff from excessive noise at work. The findings also show that a majority of responding venue owners had not taken steps to reduce noise exposure since the elements of the Control of Noise at Work Regulations regarding the entertainment sector came into force.

Noise action levels

Regulation 6 of the Control of Noise at Work Regulations places a duty on employers to reduce the risk of damage to the hearing of their employees from exposure to noise to the lowest level reasonably practicable.

The Regulations introduce **exposure action level** values and **exposure limit** values. An **exposure action** value is a level of noise at which certain action must be taken. An **exposure limit** value is a level of noise at the ear above which an employee must not be exposed.

Therefore if the workplace noise levels are above this value, any ear protection provided to the employee must reduce the noise level to the limit value at the ear. These exposure action and limit values are as follows.

- The lower exposure action levels are:
 - a daily or weekly personal noise exposure of **80 dB(A)**;
 - a peak sound pressure of **135 dB(C)**.
- The upper exposure action levels are:
 - a daily or weekly personal noise exposure of **85 dB(A)**;
 - a peak sound pressure of **137 dB(C)**.
- The exposure limit values are:
 - a daily or weekly personal noise exposure of **87 dB(A)**;
 - a peak sound pressure of **140 dB(C)**.

The peak exposure action and limit values are defined because high level peak noise can lead to short-term

and long-term hearing loss. Explosives, guns (including nail guns), cartridge tools, hammers and stone chisels can all produce high peak sound pressures.

If the daily noise exposure exceeds the lower exposure action level, then a noise assessment should be carried out and recorded by a competent person. There is a very simple test which can be done in any workplace to determine the need for an assessment. Table 14.3 gives information on the simple test to determine the need for a noise risk assessment.

Table 14.3 Simple observations to determine the need for a noise risk assessment

Observation at the workplace	Likely noise level [dB(A)]	A noise risk assessment must be made if this noise level persists for
The noise is noticeable but does not interfere with normal conversation – equivalent to a domestic vacuum cleaner	80	6 hours
People have to shout to be heard if they are more than 2 m apart	85	2 hours
People have to shout to be heard if they are more than 1 m apart	90	45 minutes

If there is a marked variation in noise exposure levels during the working week, then the Regulations allow a weekly rather than daily personal exposure level, $L_{EP,w}$, to be used. It is only likely to be significantly different to the daily exposure level if exposure on one or two days in the working week is 5 dB(A) higher than on the other days, or the working week has three or fewer days of exposure. The weekly exposure rate is not a simple arithmetic average of the daily rates. If an organisation is considering the use of a weekly exposure level, then the following provisions must be made:

- ▶ hearing protection must be provided if there are very high noise levels on any one day;
- ▶ the employees and their representatives must be consulted on whether weekly averaging is appropriate;
- ▶ an explanation must be given to the employees on the purpose and possible effects of weekly averaging.

Finally, if the working day is 12 hours, then the action levels must be reduced by 3 dB(A) because the action levels assume an 8-hour working day.

The HSE Guidance document L108 gives detailed advice on noise assessments and surveys. The most important points are that the measurements should be taken at the working stations of the employees closest to the source of the noise and over as long a period as possible, particularly if there is a variation in noise levels

during the working day. Other points to be included in a noise assessment are:

- ▶ details of the noise meter used and the date of its last calibration;
- ▶ the number of employees using the machine, time period of usage and other work activities;
- ▶ an indication of the condition of the machine and its maintenance schedule;
- ▶ the work being done on the machine at the time of the assessment;
- ▶ a schematic plan of the workplace showing the position of the machine being assessed;
- ▶ other noise sources, such as ventilation systems, that should be considered in the assessment. The control of these sources may help to reduce overall noise levels;
- ▶ recommendations for future actions, if any.

Other actions which the employer must undertake when the lower exposure action level is exceeded are to:

- ▶ inform, instruct and train employees on the hearing risks;
- ▶ supply hearing protection to those employees requesting it;
- ▶ ensure that any equipment or arrangements provided under the Regulations are correctly used or implemented.

The additional measures which the employer must take if the upper exposure action level is reached are:

- ▶ reduce and control exposure to noise by means other than hearing protection;
- ▶ establish hearing protection zones, marked by notices, and ensure that anybody entering the zone is wearing hearing protection (Figure 14.3);
- ▶ supply hearing protection and ensure that it is worn.

The Control of Noise at Work Regulations place a duty on the employer to undertake health surveillance for employees whose exposure regularly exceeds the upper action level irrespective of

whether ear protection was worn. The recommended **health surveillance** is a hearing test at intervals followed by an annual check and review of hearing levels. The checks may be extended to every 5 years if no adverse effects are found during the tests. If exposure continues over a long period, health surveillance of employees is recommended using a more substantial audiometric test. This indicates whether there has been any deterioration in hearing ability. Where exposure is between the lower and upper exposure action levels or occurs above the upper action values, health surveillance will only be required if information becomes available, perhaps from medical records, that the employee is particularly sensitive to noise-induced hearing loss.

The Regulations also place the following statutory duties on employees:

- ▶ for noise levels above the lower exposure action level, they must use any control equipment (other than hearing protection), such as silencers, supplied by the employer and report any defects;
- ▶ for noise levels above the upper exposure action level, they fulfil the obligations given above as to the hearing protection provided;
- ▶ they must take care of any equipment provided under these Regulations and report any defects;
- ▶ they must see their doctor if they feel that their hearing has become damaged;
- ▶ present themselves for health surveillance.

The Management of Health and Safety Regulations prohibits the employment of anyone under the age of 18 years where there is a risk to health from noise.

14.1.4 Noise control techniques

In addition to **reduced time exposure** of employees to the noise source, there is a simple hierarchy of control techniques:

- ▶ reduction of noise at source;
- ▶ reduction of noise levels received by the employee (known as attenuation);
- ▶ personal protective equipment, which should only be used when the above two remedies are insufficient.

Reduction of noise at source

There are several means by which noise could be reduced at source:

- ▶ change the process or equipment (e.g. replace pneumatic tyres with rubber tyres or replace diesel engines with electric motors);
- ▶ change the speed of the machine;
- ▶ improve the maintenance regime by regular lubrication of bearings, tightening of belt drives

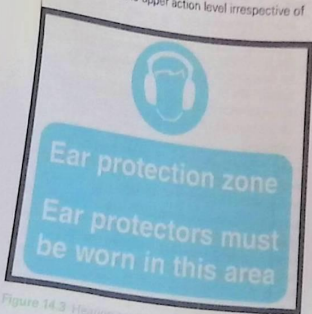


Figure 14.3 Hearing protection zone notice

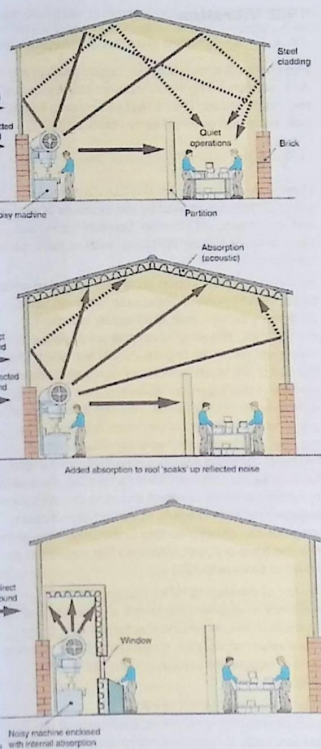


Figure 14.4 Noise paths found in a workplace: (a) the quiet area is subjected to reflected noise from a machine elsewhere in the building; (b) the correct use of roof absorption will reduce the reflected noise; (c) segregation of the noisy operation will benefit the whole workplace

Attenuation of noise levels

There are many methods of attenuating or reducing noise levels and these are covered in detail in the guide to the Regulations. The more common ones will be summarised here.

Orientation or re-location of the equipment – turn the noisy equipment away from the workforce or locate it away in separate and isolated areas.

Enclosure – surrounding the equipment with a good sound-insulating material can reduce sound levels by up to 30 dB(A). Care will need to be taken to ensure that the machine does not become overheated.

Screens or absorption walls – can be used effectively in areas where the sound is reflected from walls. The walls of the rooms housing the noisy equipment are lined with sound absorbent material, such as foam or mineral wool, or sound absorbent (acoustic) screens are placed around the equipment.

Damping – the use of insulating floor mountings to remove or reduce the transmission of noise and vibrations through the structure of the building such as girders, wall panels and flooring.

Lagging – the insulation of pipes and other fluid containers to reduce sound transmission (and, incidentally, heat loss).

Silencers – normally fitted to engines which are exhausting gases to atmosphere. Silencers consist of absorbent material or baffles.

Isolation of the workers – the provision of soundproofed workrooms or enclosures isolated away from noisy equipment (a power station control room is an example of worker isolation).

Immediate noise reduction benefits are often achieved for noise control equipment (e.g. noise enclosures) that is in good repair.

14.1.5 Personal ear protection

The provision of personal hearing protection should only be considered as a last resort. There is usually resistance from the workforce to use them and they are costly to maintain and replace. They interfere with communications, particularly alarm systems, and they can present hygiene problems.

The following factors should be considered when selecting personal ear protection:

- ▶ suitability for the range of sound spectrum of frequencies to be encountered;
- ▶ noise reduction (attenuation) offered by the ear protection;
- ▶ pattern of the noise exposure;
- ▶ acceptability and comfort of the wearer, particularly if there are medical problems;
- ▶ durability;
- ▶ hygiene considerations;
- ▶ compatibility with other personal protective equipment;
- ▶ ease of communication and ability to hear warning alarms;
- ▶ maintenance and storage arrangements;
- ▶ cost.

There are two main types of ear protection – earplugs and ear defenders (earmuffs).

Earplugs are made of sound absorbent material and fit into the ear. They can be reusable or disposable, and are able to fit most people and can easily be used with safety glasses and other personal protective equipment. Their effectiveness depends on the quality of the fit in the ear which, in turn, depends on the level of training given to the wearer. Permanent earplugs come in a range of sizes so that a good fit is obtained. The effectiveness of earplugs decreases with age and they should be replaced at the intervals specified by the supplier. A useful simple rule to ensure that the selected ear plug reduces the noise level at the ear to 87 dB(A) is to choose one with a manufacturer's rating of 83 dB(A). This should compensate for any fitting problems. The main disadvantage of ear plugs is that they do not reduce the sound transmitted through the bone structure which surrounds the ear and they often work loose with time.

Ear defenders (earmuffs) offer a far better reduction of all sound frequencies. They are generally more acceptable to workers because they are more comfortable to wear and they are easy to monitor as they are clearly visible. They also reduce the sound intensity transmitted through the bone structure surrounding the ear. A communication system can be built into earmuffs. However, they may be less effective if the user has long hair or is wearing spectacles or large ear rings. They may also be less effective if worn with helmets or face shields and are uncomfortable in warm conditions. Maintenance is an important factor with earmuffs and should include checks for wear and tear and general cleanliness.

Selection of suitable ear protection is very important as it should not just reduce sound intensities below the statutory action levels but also reduce those intensities at particular frequencies. Normally advice should be sought from a competent supplier who will be able to advise on ear protection to suit a given spectrum of noise using 'octave band analysis'.

Finally, it is important to stress that the use of ear protection must be well supervised to ensure that not only is it being worn correctly, but that it is, in fact, actually being worn. This is a particular problem where lone workers are required to wear personal protective equipment, such as ear defenders. The requirement can be emphasised by the use of signs and warning notices on equipment and in company vehicles. Unannounced monitoring visits to the work site also encourage the use of personal protective equipment. If there is a persistent refusal to wear personal protective equipment, then disciplinary procedures must be initiated.

The issue of ear defenders to the workforce is a last resort after measures outlined in 14.1.4 have been considered.

14.2 Vibration

14.2.1 Ill-health due to vibration

Hand-held vibrating machinery (such as drills, sanders and grinders, powered saws and trimmers and chainsaws) can produce vibration from hand-arm or whole-body vibration.

Hand-arm vibration syndrome

Hand-arm vibration syndrome (HAVS) describes a group of diseases caused by the exposure of the hand and arm to external vibration. Some of the conditions have been described under WRULDs, such as carpal tunnel syndrome.

However, the best known disease is **vibrating finger (VWF)** in which the circulation of the blood, particularly in the hands, is adversely affected by the vibration. The early symptoms are tingling and numbness felt in the fingers, usually sometime towards the end of the working shift. As exposure continues, the tips of the fingers go white and then the whole hand may become affected. This results in a loss of grip strength and manual dexterity. Attacks can be triggered by damp and/or cold conditions and, on warming, 'pins and needles' are experienced (Figure 14.5). If the condition is allowed to persist, more serious symptoms become apparent including discoloration and engorgement of the fingers. In very advanced cases gangrene can develop leading to the amputation of the affected hand or finger. VWF was first detailed as an industrial disease in 1911.

The risk of developing HAVS depends on the frequency of vibration, the length of exposure and the tightness of the grip on the machine or tool. Some typical values of vibration measurements for common items of equipment used in industry are given in Table 14.4.

When assessing the risk of HAVS developing among employees, the source of the vibration, such as reciprocating, rotating and vibrating tools and equipment, needs to be considered first together with the age of the equipment, its maintenance record, its suitability for the job and any information or guidance available from the manufacturer. The number of employees using the tooling or equipment, the duration and frequency of their use and any relevant personal factors, such as a pre-existing circulatory problem, all form part of the assessment. Environmental factors, particularly exposure to cold and/or wet weather and the nature of the job itself, are also important factors to be considered during such a risk assessment. Finally, an examination of the existing controls and their effectiveness and the frequency, magnitude and direction of the vibration are important elements of evaluation. Other issues could include the effectiveness

Regular exposure to HAV can cause a range of permanent injuries to hands and arms, collectively known as hand–arm vibration syndrome (HAVS). The injuries can include damage to the:

▼ Blood circulatory system (e.g. vibration white finger)

▼ Sensory nerves

▼ Muscles

▼ Bones

▼ Joints

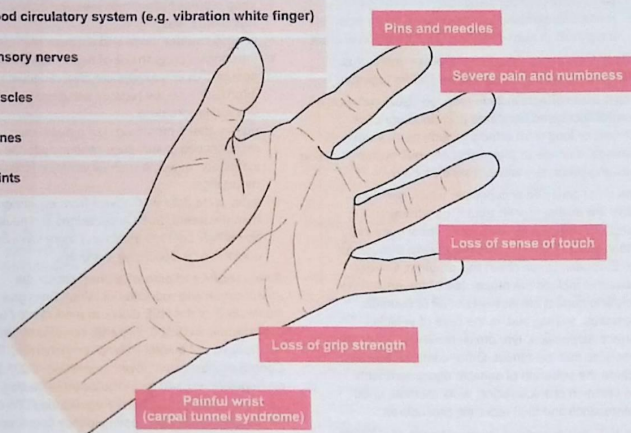


Figure 14.5 Injuries which can be caused by hand–arm vibration

Table 14.4 Examples of vibration exposure values measured by the HSE on work equipment

Equipment	Condition	Vibration reading (m/s^2)
Road breakers	Typical	12
	Modern design and trained operator	5
	Worst tools and operating conditions	20
Demolition hammers	Modern tools	8
	Typical	15
	Worst tools	25
Hammer drills	Typical	9
	Best tools and operating conditions	6
	Worst tools and operating conditions	25
Large-angle grinders	Modern vibration-reduced designs	4
	Other types	8
Small-angle grinders	Typical	2–6
Chainsaws	Typical	6
Brush cutter or strimmer	Typical	4
	Best	2
Sanders (orbital)	Typical	7–10

of any personal protective equipment provided and any instruction or training given.

Whole-body vibration

Whole-body vibration (WBV) is caused by vibration from machinery passing into the body either through the feet of standing workers or the buttocks of sitting workers. It is the shaking or jolting of the human body through a supporting surface (usually a seat or the floor), for example when driving or riding on a vehicle along an unmade road, operating earth-moving machines or standing on a structure attached to a large, powerful, fixed machine, which is impacting or vibrating.

The most common ill-health effect is severe back pain which, in severe cases, may result in permanent injury.

Reasons for back pain in drivers can include:

- ▶ poor design of controls, making it difficult for the driver to operate the machine or vehicle easily or to see properly without twisting or stretching;
- ▶ incorrect adjustment by the driver of the seat position and hand and foot controls, so that it is necessary to continually twist, bend, lean and stretch to operate the machine;
- ▶ sitting for long periods without being able to change position;
- ▶ poor driver posture;

- ▶ repeated manual handling and lifting of loads by the driver;
- ▶ excessive exposure to whole-body vibration, particularly to shocks and jolts;
- ▶ repeatedly climbing into or jumping down from a high cab or one which is difficult to get in and out.

The risk increases where the driver or operator is exposed to two or more of these factors together.

Other acute effects include reduced visual and manual control, increased heart rate and blood pressure.

Chronic or long-term effects include permanent spinal damage, damage to the central nervous system, hearing loss and circulatory and digestive problems.

The most common occupations which generate WBV are driving fork-lift trucks, construction vehicles and agricultural or horticultural machinery and vehicles. There is growing concern throughout the European Union about this problem. Control measures include the proper use of the equipment including correct adjustments of air or hydraulic pressures, seating and, in the case of vehicles, correct suspension, tyre pressures and appropriate speeds to suit the terrain. Other control measures include the selection of suitable equipment with low vibration characteristics, work rotation, good maintenance and fault reporting procedures.

The HSE commissioned measurements of WBV on several machines and some of the results are shown in Table 14.5.

Table 14.5 Machines which could produce significant whole-body vibration

Machine	Activity	Vibration reading (m/s^2)
3-tonne articulated dumper truck	Removal of spoil	0.78
Dumper truck	Transport of spoil	1.13
25-tonne articulated dumper truck	Transport of spoil	0.91
Bulldozer	Dozing	1.16
4-tonne twin-drum	Finishing tarmac	0.86
80-tonne rigid dumper truck	Transport of spoil	1.03

Preventative and precautionary measures

The control strategy outlined in Chapter 4 can certainly be applied to ergonomic risks. The common measures used to control ergonomic ill-health effects are to:

- ▶ implement results of task analysis and identification of repetitive actions;
- ▶ eliminate vibration-related or hazardous tasks by performing the job in a different way;
- ▶ ensure that the correct equipment (properly adjusted) is always used;
- ▶ introduce job rotation so that workers have a reduced time exposure to the hazard;

- ▶ during the design of the job ensure that poor posture is avoided;
- ▶ undertake a risk assessment;
- ▶ keep reports from employees and safety representatives;
- ▶ keep ill-health reports and absence records;
- ▶ introduce a programme of health surveillance;
- ▶ ensure that employees are given adequate information on the hazards and develop a suitable training programme;
- ▶ ensure that a programme of preventative maintenance is introduced and include the regular inspection of items such as vibration isolation mountings;
- ▶ keep up to date with advice from equipment manufacturers, trade associations and health and safety sources (more and more low vibration equipment is becoming available).

A very useful and extensive checklist for the identification and reduction of WRULDs is given in Appendix 2 of the HSE *Guide to work-related upper limb disorders* HSG60. The HSE has also produced two very useful guides – *Hand-arm vibration, The Control of Vibration at Work Regulations 2005 Guidance on Regulations L140* and *Whole-body vibration, The Control of Vibration at Work Regulations 2005 Guidance on Regulations L141*. These guidance documents offer detailed advice on the implementation of the Regulations.



Figure 14.6 Breaker mounted on an excavator to reduce vibrations

14.2.2 The Control of Vibration at Work Regulations

The Control of Vibration at Work Regulations introduced for both HAV and WBV, a daily exposure limit and M values. These values are as follows:

1. For HAV:
 - (a) the daily exposure limit value normalised to 8-hour reference period is $5m/s^2$;

(b) the daily exposure action value normalised to an 8-hour reference period is 2.5m/s^2 .

2. For WBV:

(a) the daily exposure limit value normalised to an 8-hour reference period is 1.15m/s^2 ;

(b) the daily exposure action value normalised to an 8-hour reference period is 0.5m/s^2 .

An exposure limit value must not be exceeded. If an exposure action value is exceeded, then action must be taken to reduce the value. However, operators of some off-road machines and vehicles may exceed the limit value but this will depend on the task, vehicle speed, ground conditions, driver skill and duration of the operation (see the HSE website).

The term A(8) is added to the exposure limit or action value to denote that it is an average value spread over an 8-hour working day. Thus the daily exposure limit value for HAV is 5m/s^2 A(8).

Hand-arm vibration

Many machines and processes used in industry produce HAV. Typical high-risk processes include:

- ▶ grinding, sanding and polishing wood and stone;
- ▶ cutting stone, metal and wood;
- ▶ riveting, caulking and hammering;
- ▶ compacting sand, concrete and aggregate;
- ▶ drilling and breaking rock, concrete and road surfaces; and
- ▶ surface preparation, including de-scaling and paint removal.

There are several ways to ascertain the size of the vibration generated by equipment and machines. Manufacturers must declare vibration emission values for portable hand-held and hand-guided machines and provide information on risks. Other important sources for vibration information include scientific and technical journals, trade associations and online databases. HSE experience has shown that the vibration level is higher in practice than that quoted by many manufacturers. The reasons for this discrepancy may be that:

- ▶ the equipment is not well maintained;
- ▶ the equipment is not suitable for the material being worked;
- ▶ the tool has not been purchased from a reputable supplier;
- ▶ the accessories are not appropriate or are badly fitted;
- ▶ the operative is not using the tool properly.

In view of these problems, it is recommended that the declared value should be doubled when comparisons are made with exposure limits. As the exposure limit or action value is averaged over 8 hours, it is possible to work with higher values for a reduced exposure time. Table 14.6 shows the reduction in exposure time as the size of the vibration increases.

Table 14.6 The change in exposure times as vibration increases

The change in exposure times as vibration increases							
Value of vibration (m/s^2)	2.5	3.5	5	7	10	14	20
Exposure time to reach action value (hours)	8	4	2	1	30 min	15 min	8 min
Exposure time to reach limit value (hours)	over 24	16	8	4	2	1	30 min

The Guidance (L140) gives very useful advice on the measurement of vibration, undertaking a suitable and sufficient risk assessment, control measures, health surveillance and training of employees. The following points summarise the important measures which should be taken to reduce the risks associated with HAV:

1. avoid, whenever possible, the need for vibration equipment;
2. undertake a risk assessment which includes a soundly based estimate of the employees' exposure to vibration;
3. develop a good maintenance regime for tools and machinery. This may involve ensuring that tools are regularly sharpened, worn components are replaced or engines are regularly tuned and adjusted;
4. introduce a work pattern that reduces the time exposure to vibration;
5. issue employees with gloves and warm clothing. There is a debate as to whether anti-vibration gloves are really effective but it is agreed that warm clothing helps with blood circulation which reduces the risk of VWF. Care must be taken so that the tool does not cool the hand of the operator;
6. introduce a reporting system for employees to use so that concerns and any symptoms can be recorded and investigated; and
7. encourage employees to check regularly for any symptoms of vibration related ill-health and to participate in any health surveillance measures provided.

It is important that drill bits and tools are kept sharp and used intact – an angle grinder with a chipped cutting disc will lead to a large increase in vibration as well as being dangerous.

Whole-body vibration

The Regulations require the control of the risks from whole-body vibration. This should be based on an assessment of the risk and exposure. In most cases it is simpler to make a broad assessment of the risk rather than try to assess exposure in detail, concentrating the main effort on introducing controls. The requirements of the Regulations are to:

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- ▶ assess the vibration risk to employees;
- ▶ decide if they are likely to be exposed above the daily exposure action value (EAV) and if they are:
 - ▶ introduce a programme of controls to eliminate or reduce their daily exposure so far as is reasonably practicable;
 - ▶ decide if they are likely to be exposed above the daily exposure limit value (ELV) and if they are:
 - ▶ take immediate action to reduce their exposure below the limit value;
- ▶ provide information and training on health risks and controls to employees at risk;
- ▶ consult the trade union safety representative or employee representative about the risks and the plans to address these risks;
- ▶ keep a record of the risk assessment and control actions;
- ▶ review and update the risk assessment regularly.

If a broad risk assessment has been made and the appropriate and reasonable control actions taken, there is no need to measure the exposure to vibration of the employee. Most machine and vehicle activities in normal use produce daily exposures below the limit value. But some off-road machinery operated for long periods in conditions that generate high levels of vibration or jolting may exceed the exposure limit value.

The measurement of WBV is very difficult and can only be done accurately by a specialist competent person. If the risk assessment has been made and the recommended control actions are in place, there is no need to measure the exposure of employees to vibration. However, the HSE has suggested that employers can use the following checklist to estimate whether exposure to WBV is high:

1. there is a warning in the machine manufacturer's handbook that there is a risk of WBV;
1. the task is not suitable for the machine or vehicle being used;
3. operators or drivers are using excessive speeds or operating the machine too aggressively;
4. operators or drivers are working too many hours on machines or vehicles that are prone to WBV;
5. road surfaces are too rough and potholed or floors uneven;
6. drivers are being continually jolted or when going over bumps rising from their seats;
7. vehicles designed to operate on normal roads are used on rough or poorly repaired roads;
8. operators or drivers have reported back problems.

If one or more of the above applies, then exposure to WBV may be high.

If checks on exposure levels are required, information in the vehicle manufacturer's handbook or data published by the HSE may be used. An exposure calculator

is available on the HSE website (at: www.hse.gov.uk/vibration) for a range of machines and vehicles in different working conditions. However, it is not effective for most employers to direct their efforts towards controlling the risks rather than trying to measure vibration exposures precisely. WBV in industry is often from driving vehicles, such as tractors or fork-lifts, over rough terrain or uneven floors. It is highly unlikely that driving vehicles on smooth roads will produce problems. The HSE Guidance document, L141, gives detailed advice to help with the risk assessment and on estimating daily exposure levels. WBV risks are low for exposures around the action value and usually a few simple control measures are necessary.

As explained earlier, the most common health problem associated with WBV is back pain. This pain may not have been caused by other activities but WBV will aggravate it.

The actions for controlling the risks from WBV need to ensure that:

- ▶ the driver's seat is correctly adjusted so that all controls can be reached easily and that the driver's weight setting on their suspension seat, if available, is correctly adjusted. The seat should have a back rest with lumbar support;
- ▶ anti-fatigue mats are used if the operator has to stand for long periods;
- ▶ the speed of the vehicle is such that excessive jolting is avoided. Speeding is one of the main causes of excessive WBV;
- ▶ all vehicle controls and attached equipment are operated smoothly;
- ▶ only established site roadways are used;
- ▶ only suitable vehicles and equipment are selected to undertake the work and cope with the ground conditions;
- ▶ the site roadway system is regularly maintained;
- ▶ all vehicles are regularly maintained with particular attention being paid to tyre condition and pressure, vehicle suspension systems and the driver's seat;
- ▶ work schedules are regularly reviewed so that long periods of exposure on a given day are avoided and drivers have regular breaks away from the vehicle;
- ▶ prolonged exposure to WBV is avoided for at risk groups (older people, young people, people with a history of back problems and pregnant women);
- ▶ employees are aware of the health risks from WBV, the results of the risk assessment and the ill-health reporting system. They should also be trained to drive in such a way that excessive vibration is reduced.

A simple health monitoring system that includes a questionnaire checklist should be agreed with employees or their representatives (available on the HSE website) to be completed once a year by employees at risk. Employees with back problems should be referred to an occupational health specialist.



Figure 14.7 (a) Vibrating roller with risk of whole-body vibration



Figure 14.7 (b) Remote control vibrating plate weighing 1.2 tons with compaction in excess of a 7 ton roller which eliminates the risk of whole-body vibration. The operator is protected from vibrations, noise and dust. The machine can only be operated if line of sight is intact. In case of a loss of control the proximity recognition sensor keeps the operator safe

Personal information about the health of individual employees must be treated confidentially.

14.2.3 Role of health surveillance

The Control of Vibration at Work Regulations require the employer to ensure that employees should be given suitable health surveillance if:

- ▶ the risk assessment indicates that there is a risk to the health of any employees who are, or are liable to be, exposed to vibration, or
- ▶ employees are exposed to vibration at or above an exposure action value.

Records of the health surveillance must be kept, employees given access to their own records and the enforcing authorities provided with copies, as required by them. A range of specified action must be taken if problems are found with the health surveillance results. More information on the Control of Vibration at Work Regulations is given in Chapter 15.

14.3 Radiation

14.3.1 Ionising radiation

Ionising radiation is emitted from radioactive materials, either in the form of directly ionising alpha and beta particles or indirectly ionising X-rays and gamma rays or neutrons. It has a high energy potential and an ability to penetrate, ionise and damage body tissue and organs.

All matter consists of atoms within which are a nucleus containing protons and neutrons, and orbiting electrons. The number of protons within the atom defines the element – for example, hydrogen has 1 proton and lead has 82 protons. Some atoms are unstable and will change into atoms of another element, emitting ionising radiation in the process. The change is called radioactive decay, and the ionising radiations most commonly emitted are alpha and beta particles and gamma rays. X-rays are produced by bombarding a metal target with electrons at very high speeds using very high voltage electrical discharge equipment. Neutrons are released by nuclear fission and are not normally found in manufacturing processes.

Alpha particles consist of two protons and two neutrons and have a positive charge. They have little



Figure 14.8 Typical ionisation warning sign

power to penetrate the skin and can be stopped using very flimsy material, such as paper. Their main route into the body is by ingestion.

Beta particles are high-speed electrons whose power of penetration depends on their speed, but penetration is usually restricted to 2 cm of skin and tissue. They can be stopped using aluminium foil. There are normally two routes of entry into the body – inhalation and ingestion.

Gamma rays, which are similar to **X-rays**, are electromagnetic radiation and have far greater penetrating power than alpha or beta particles. They are produced from nuclear reactions and can pass through the body.

The two most common measures of radiation are the Becquerel (Bq), which measures the activity of a radioactive substance per second, and the Sievert (Sv), which measures the biological effects of the radiation – normally measured in millisieverts (mSv).

Thus, the Becquerel (Bq) measures the amount of radiation in a given environment and the millisievert (mSv) measures the ionising radiation dose received by a person.

Ionising radiation occurs naturally from man-made processes and about 87% of all radiation exposure is from natural sources. The Ionising Radiations Regulations specify a range of dose limits, some of which are given in Table 14.7.

Table 14.7 Typical radiation dose limits

	Dose (mSv)	Area of body
Employees aged 18 years	20	Whole body per year
Trainees 16–18 years	6	Whole body per year
Any other person	1	Whole body per year
Women employees of child-bearing age	13	The abdomen in any consecutive 3-month period
Pregnant employees	1	During the declared term of the pregnancy

Harmful effects of ionising radiation

Ionising radiation attacks the cells of the body by producing chemical changes in the cell DNA by ionising it (thus producing free radicals), which leads to abnormal cell growth. The effects of these ionising attacks depend on the following factors:

- ▶ the size of the dose – the higher the dose then the more serious will be the effect.
- ▶ the area or extent of the exposure of the body – the effects may be far less severe if only a part of the body (e.g. an arm) receives the dose;
- ▶ the duration of the exposure – a long exposure to a low dose is likely to be more harmful than a short exposure to the same quantity of radiation.

Acute exposure can cause, dependent on the size of the dose, blood cell changes, nausea and vomiting.

skin burns and blistering, collapse and death. **Chronic exposure** can lead to anaemia, leukaemia and other forms of cancer. It is also known that ionising radiation can have an adverse effect on the function of the reproductive organs and processes. Increases in cases of sterility, stillbirths and malformed foetuses have also been observed.

The health effects of ionising radiation may be summarised into two groups – **somatic effects**, which refer to cell damage in the person exposed to the radiation dose and **genetic effects**, which refer to damage done to any future children of the irradiated person.

Sources of ionising radiation

The principal workplaces which could have ionising radiation present are the nuclear industry, medical centres (hospitals and research centres) and educational centres. Radioactive processes are used for the treatment of cancers, and radioactive isotopes are used for many different types of scientific research. X-rays are used extensively in hospitals, but they are also used in industry for non-destructive testing (e.g. crack detection in welds). Smoke detectors, used in most workplaces, also use ionising radiations.

Ionising radiations can also occur naturally – the best example being radon, which is a radioactive gas that occurs mainly at or near granite outcrops where there is a presence of uranium. It is particularly prevalent in Devon and Cornwall. The gas enters buildings normally from the substructure through cracks in flooring or around service inlets.

The Ionising Radiations Regulations have set two levels above which remedial action, such as fitting sumps and extraction fans, has to be taken to lower the radon level in the building. The first action level is 400 Bq/m³ in workplaces and 200 Bq/m³ in domestic properties. At levels above 1000 Bq/m³, remedial action should be taken within 1 year. The average background radiation in the UK is 2.4 mSv per year. Background radiation levels are much higher elsewhere in the world – 260 mSv have been recorded in Iran.

About half of the background radiation in the UK is caused by radon. Radon gas is responsible for 5% of lung cancer cases. Radon is not generally a problem unless it is able to accumulate in confined spaces such as basements, cellars or lift shafts. An impermeable membrane beneath the floor of the building can be laid to prevent the gas entering the building through the floor. This latter treatment is normally only suitable for new buildings but does cost less than 10% of the cost of a sump and has no running costs. There are now government-defined 'radon-affected areas' throughout the UK, so that checks should be made if underground spaces in buildings are to be used.



Figure 14.9 X-ray generator cabinet

About 14% of exposures to ionising radiation are due to medical exposures during diagnostic or treatment processes.

The hazards are categorised as either stochastic or non-stochastic. The principal stochastic hazard is cancer in various forms. The main non-stochastic effects include radiation burns, radiation sickness, cataracts and damage to unborn children.

Personal radiation exposure can be measured using a film badge, which is worn by the employee over a fixed time interval. The badge contains a photographic film which, after the time interval, is developed and an estimate of radiation exposure is made. A similar device, known as a radiation dose meter or detector, can be positioned on a shelf in the workplace for 3 months, so that a mean value of radiation levels may be measured. Instantaneous radiation values can be obtained from portable hand-held instruments, known as Geiger counters, which continuously sample the air for radiation levels. Similar devices are available to measure radon levels.



Figure 14.10 Radon monitoring equipment

the eyes are at risk from the effect of burning. The skin will burn (as in sunburn) and repeated exposure can lead to skin cancer. Skin which is exposed to strong sunlight should be protected either by clothing or sun creams. This problem has become more common with the reduction in the ozone layer (which filters out much ultraviolet light). The eyes can be affected by a form of conjunctivitis which feels like grit in the eye, and is called by a variety of names dependent on the activity causing the problem. Arc welders call it 'arc eye' or 'welder's eye' and skiers 'snow blindness'. Cataracts caused by the action of ultraviolet radiation on the eye lens are another possible outcome of exposure.

The most dangerous form of skin cancer, malignant melanoma, has increased by over 40% over the last 10 years making it the cancer with the fastest rising number of cases in the UK. Outdoor workers that could be at risk include farm or construction workers, market gardeners, outdoor activity workers and some public service workers. Those who are particularly at risk have:

- ▶ fair or freckled skin that does not tan, or goes red or burns before it tans;
- ▶ red or fair hair and light coloured eyes;
- ▶ a large number of moles.

Employers need to be aware of the risks their employees are taking when they work outside without

14.3.2 Non-ionising radiation

Non-ionising radiation includes ultraviolet, visible light (this includes lasers which focus or concentrate visible light), infrared and microwave radiations. As the wavelength is relatively long, the energy present is too low to ionise atoms which make up matter. The action of non-ionising radiation is to heat cells rather than change their chemical composition.

The Control of Artificial Optical Radiation at Work Regulations govern non-ionising radiation (see 14.3.3). The Personal Protective Equipment at Work Regulations are also relevant, since the greatest hazard is tissue burning of the skin or the eyes.

Ultraviolet radiation (UV) occurs with sunlight and with electric arc welding. In both cases, the skin and

adequate protection from the sun. With growing concern following the rise in skin cancers, the HSE has suggested the following hierarchy of controls for outdoor working:

- ▶ relocate some jobs inside a building or to a shady location;
- ▶ undertake some outdoor work earlier or later in the day;
- ▶ provide personal protection such as:
 - ▶ wearing long sleeve shirts or loose clothing with a close weave
 - ▶ wearing hats with a wide brim
 - ▶ using a high factor sunscreen of at least SPF15 on any exposed skin;
- ▶ provide suitable education and training for outdoor workers;
- ▶ provide suitable information and supervision to instigate safe systems of work that protect workers from the sun.

UV radiation has some beneficial effects such as the accumulation of vitamin D which strengthens bones.

Where UV insectocutors are used, normally to control flying insects, it is important that emitting labels are fitted and not ones that are used to sterilise surgical instruments which happened on one occasion.

Lasers use visible light and light from the wavelength spectrum (infrared and ultraviolet) laser implies, they produce 'light by stimulated emission of radiation'. The highly concentrated and does not diverge with distance and the output is directly related to the chemical composition of the medium used in the particular laser. The output beam may be pulsed or continuous – the choice being dependent on the application of the laser. Lasers have a large range of applications including bar code reading at a supermarket, the cutting and welding of metals and accurate measurement of distances and elevations required in land and mine surveying. They are also extensively used in surgery for cataract treatment and the treatment of blood vessels.

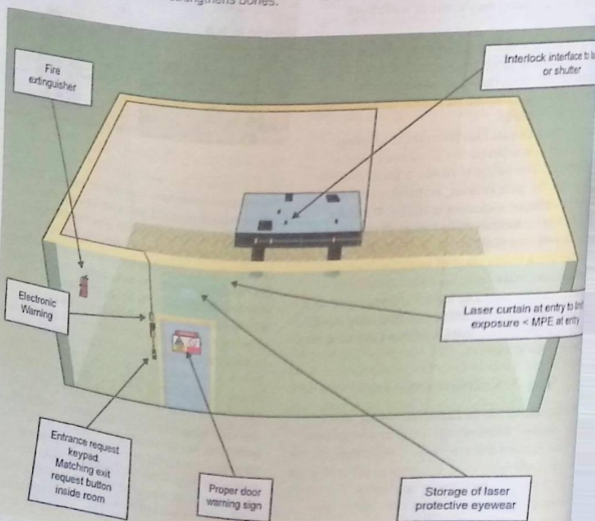


Figure 14.11 A proper Class 4 laser area setup for detachable access control. Curtain design and layout varies in environment. Class 4 laser areas in a research or university environment usually run long-term experiments that require unattended operation. In such cases, detachable entryway controls are appropriate. By design, persons have been properly trained and given the keypad access code may momentarily 'defeat' the interlock to enter the laser controlled area protected by a magnetically locked door.

The International Electrotechnical Commission (IEC) and the American National Standards Institute (ANSI) have defined seven classes of laser (1, 1M, 2, 2M, 3R, 3B and 4) in ascending size of power output. Classes 1, 1M, 2 and 2M are relatively low hazard and only emit light in the visible band. Direct eye contact must be avoided with classes 3R, 3B and 4. These are more hazardous than classes 1 and 2 and the appointment of a laser safety officer is recommended. A Class 4 laser can burn the skin and cause permanent eye damage as a result of direct, diffuse or indirect exposure to the beam. Such Class 4 lasers can ignite combustible materials, and are a fire risk. All lasers should carry information stating their class and any precautions required during use.

The main hazards associated with lasers are eye and skin burns, toxic fumes, electricity and fire. The vast majority of accidents with lasers affect the eyes. Retinal damage is the most common and is irreversible. Cataract development and various forms of conjunctivitis can also result from laser accidents. Skin burning and reddening (erythema) are less common and are reversible.

Infrared radiation is generated by fires and hot substances and can cause eye and skin damage similar to that produced by ultraviolet radiation. It is a particular problem to fire-fighters and those who work in foundries or near furnaces. Eye and skin protection are essential.



Figure 14.12 Metal furnace - source of infrared heat

Microwaves are used extensively in cookers and mobile telephones and there are ongoing concerns about associated health hazards (and several inquiries are currently under way). The severity of any hazard is proportional to the power of the microwaves. The principal hazard is the heating of body cells, particularly those with little or no blood supply to dissipate the heat. This means that tissues such as the eye lens are most at risk from injury. However, it must be stressed that any risks are higher for items such as cookers than for low-powered devices such as mobile phones.

The measurement of non-ionising radiation normally involves the determination of the power output being received by the worker. Such surveys are best performed by specialists in the field, as the interpretation of the survey results requires considerable technical knowledge.

14.3.3 Radiation protection strategies Ionising radiation

Protection is obtained by the application of shielding, time and distance either individually or, more commonly, using a mixture of all three.

Shielding is the best method because it is an 'engineered' solution. It involves the placing of a physical shield, such as a layer of lead, steel and concrete, between the worker and the radioactive source. The thicker the shield the more effective it is.

Time involves the use of the reduced time exposure principle and thus reduces the accumulated dose.

Distance works on the principle that the effect of radiation reduces as the distance between the worker and the source increases.

Other measures include the following:

- ▶ effective emergency arrangements;
- ▶ training of employees;
- ▶ the prohibition of eating, drinking and smoking adjacent to exposed areas;
- ▶ a high standard of personal cleanliness and first-aid arrangements;
- ▶ strict adherence to personal protective equipment arrangements, which may include full body protection and respiratory protection equipment;
- ▶ procedures to deal with spillages and other accidents;
- ▶ prominent signs and information regarding the radiation hazards;
- ▶ medical surveillance of employees.

The Ionising Radiations Regulations specify a range of precautions which must be taken, including the appointment of a Radiation Protection Supervisor as the competent person and a Radiation Protection Adviser.

The **Radiation Protection Supervisor** must be appointed by the employer to advise on the necessary

measures for compliance with the Regulations and its Approved Code of Practice. The person appointed, who is normally an employee, must be competent to supervise the arrangements in place and have received relevant training.

The **Radiation Protection Adviser** is appointed by the employer to give advice to the Radiation Protection Supervisor and employer on any aspect of working with ionising radiation including the appointment of the Radiation Protection Supervisor. The Radiation Protection Adviser is often an employee of a national organisation with expertise in ionising radiation. A Radiation Protection Adviser is not needed when the only work with ionising radiation is as specified in Schedule 1 of the Regulations.

Non-ionising radiation

For ultraviolet and infrared radiation, eye protection in the form of goggles or a visor is most important, particularly when undertaking arc welding or furnace work. Skin protection is also likely to be necessary for the hands, arms and neck in the form of gloves, sleeves and a collar. For construction and other outdoor workers, protection from sunlight is important, particularly for the head and nose. Sun creams should also be used.

For laser operations, engineering controls such as fixed shielding and the use of non-reflecting surfaces around the workstation are recommended. For laser in the higher class numbers, special eye protection is recommended. A risk assessment should be undertaken before a laser is used.

Engineering controls are primarily used for protection against microwaves. Typical controls include the enclosure of the whole microwave system in a metal surround and the use of an interlocking device that will not allow the system to operate unless the door is closed.

Intense sources of artificial light in the workplace, particularly from UV radiation and powerful lasers, can harm the eyes and skin of workers and need to be properly managed. The Control of Artificial Optical Radiation at Work Regulations came into force in 2010 and implements the Physical Agents (Artificial Optical Radiation) Directive (2006/25/EC). The aim of the Regulations is to ensure that standards are set so that all workers are protected from harm arising from exposure to hazardous sources of artificial light. As with the previous Noise and Vibration Regulations, it contains provisions on risk assessment, control of exposure, health surveillance and information, instruction and training. The Regulations are based on the limit values incorporated in the guidelines issued by the International Commission on Non-Ionising Radiation

Workers should be protected from harm from light in the workplace, to ensure that the skin of workers are properly protected from sources of light at work that can damage skin. Such light sources include ultraviolet and infrared radiation produced by artificial sources such as lasers and welding arcs. Examples of such light sources include:

- ▶ welding work (both arc and oxy-fuel) and cutting causing mainly eye damage;
- ▶ furnaces and foundries causing eye and skin damage;
- ▶ printing involving the UV curing of inks causing mainly skin damage;
- ▶ motor vehicle repairs involving the UV curing of paints causing mainly skin damage;
- ▶ medical and cosmetic treatments involving laser surgery, blue light and UV therapies causing eye and skin damage;
- ▶ all use of Class 3B and Class 4 lasers potentially causing permanent eye and skin damage.

More information is given on these Regulations in Chapter 15.

The EMF Directive

Electric, magnetic, and electromagnetic fields (EMF) are a form of non-ionising radiation that arises when electrical energy is used. An electric field is generated by electric charges, while a magnetic field occurs around an electric current. Electromagnetic fields are mutually produced by time-varying magnetic and electric fields. When electric fields act on conductive materials (such as the human body), they influence the distribution of electric charges at their surface, causing current to flow through the body to the ground. Magnetic fields induce circulating currents within the human body. The strength of these currents depends on the intensity of the outside magnetic field. If sufficient, these currents can stimulate nerves and muscles or cause other biological effects such as nausea.

Common sources of electromagnetic fields include mobile phones, power lines, radio and television broadcasts, processes such as radiofrequency heating and welding, household electrical wiring and appliances; electric motors; computer screens; telecommunications; transport and distribution of electricity; broadcast and security detection devices.

The EMF Directive covers a frequency spectrum from 0 to 300 GHz, which includes static magnetic fields, low frequency electric and magnetic fields, through radio frequency and microwave frequencies.

14.3.4 Welding operations

Over 1,000 accidents involving welding work are reported to the HSE each year. There are several different types of welding operation. The most common are:

- ▶ manual metal arc welding;
- ▶ metal inert-gas welding (MIG);
- ▶ tungsten inert-gas welding (TIG);
- ▶ oxy-acetylene welding.

The non-ionising radiation hazards caused by arc welding are not the only hazards associated with welding operations. The hazards from fume inhalation, trailing cables and pipes and the manual handling of cylinders are also present. There have also been serious injuries resulting from explosions and fires during welding processes. Accidents are often caused by lack of training and faulty equipment and they are often made worse by the lack of complete personal protective equipment. Many of these accidents occur on farms where welding equipment is used to make on-the-spot repairs to agricultural machinery.

14.3.5 The role of monitoring and health surveillance

The monitoring and health surveillance arrangements for exposure to ionising radiation are detailed under Part 5 of the Ionising Radiations Regulations. The Regulations specify that the employer of any individual exposed to ionising radiation as a result of work activities has the responsibility for deciding when such an employee needs to be designated as a classified person in accordance with Regulation 20. Before that person is classified, the employer will need to ensure that the employee has been certified as fit for the intended type of work within the last 12 months. This may require a medical examination. The employer then needs to make arrangements with the appointed doctor (or employment medical adviser) for continuing medical surveillance. Also, the employer will need to arrange or adequate medical surveillance for any employee who has received an overexposure, whether or not that employee has been designated as a classified person.

The ACoP further states that the main purpose of medical surveillance is to determine an individual's fitness or continuing fitness for the intended work with ionising radiation. The fitness of the person is not restricted to possible health effects from exposure to ionising radiation. The appointed doctor (or employment medical adviser) will need to take account of specific features of the work with ionising radiation, such as the fitness of the individual:

- ▶ to wear any personal protective equipment (including respiratory protective equipment) required to restrict exposure;
- ▶ with a skin disease, to undertake work involving unsealed radioactive materials; and
- ▶ with serious psychological disorders, to undertake work with radiation sources that involve a special level of responsibility for safety.

The Regulations also require that the employer maintains a health record of any employee receiving

health surveillance, and that record (or a copy) is kept until the person to whom the record relates has or would have attained the age of 75 years but in any event for at least 50 years from the date of the last entry made in it.

14.4 Stress

The HSE has estimated that work-related stress costs society around £3.8 billion a year. Approximately 12.8 million working days have been lost due to stress, depression and anxiety in one year alone when 530,000 people reported that they were suffering from work-related stress at a level that was making them ill. Stress and musculoskeletal disorders are the largest causes of work-related ill-health. There are on average over 400,000 workers suffering from stress-related ill-health each year of which 50% have suffered for over one year or longer. Proportionately, cases of work-related stress occurred most commonly in larger organisations, particularly among managerial staff and in professional occupations (notably public administration, health and social care, and education), and most commonly again among the 35–54 age group. Women suffered higher rates of stress disorders than men. The overall situation seems statistically not to be improving year on year. This has been accompanied by an increase in civil claims resulting from stress at work. Stress and the related issues of workplace bullying and harassment are issues that simply cannot be ignored.

Work-related stress

In 2001, the HSE defined work-related stress as the reaction people have to excessive pressure or other types of demand placed on them. An important distinction is made in this definition between pressure, which can be a positive state if managed appropriately and a normal reaction to reasonable demands, and stress which can arise in response to intense, continuous or prolonged exposure to excessive pressures and can be detrimental to health. However, a recent report commissioned by the HSE has concluded that there is no simple and universal definition of work-related stress, largely because of the complex nature of work-related stress.

The European Commission defines work-related stress as an 'emotional and psycho-physiological reaction to aversive and noxious aspects of work, work environments and work organisations. It is a state characterised by high levels of arousal and distress and often by feelings of not coping'.

However, the recent HSE report distinguished work-related stress as different from occupational stress. The former includes cases where work may have aggravated the experience of stress and associated symptoms of ill-health regardless of original cause. Here work may be a contributory factor but not necessarily the sole cause.

The latter refers to cases where work is the sole cause of the experience of stress and associated symptoms of ill-health.

Stress is not a disease – it is the natural reaction to excessive pressure. It can be defined as the reaction that people have when they are unable to cope with excessive pressures and demands. Stress can lead to an improved performance but is not generally a good thing as it is likely to lead to both physical and mental ill-health, such as high blood pressure, peptic ulcers, skin disorders and depression.

Symptoms of stress

There are four groups of stress symptoms – physical, behavioural, emotional and cognitive. The physical symptoms include chest pains, nausea and frequent colds. Sufferers may eat less, smoke and drink more and develop nervous habits. They may be unable to relax, become irritable and depressed. They may also have memory problems, be unable to concentrate and become very anxious. Stress victims experience a severe lack of control.

Causes of stress

Most people experience stress at some time during their lives, e.g. during an illness or death of a close relative or friend. However, recovery normally occurs after the particular crisis has passed. The position is, however, often different in the workplace because the underlying causes of the stress, known as work-related stressors, are not relieved but continue to build up the stress levels until the employee can no longer cope.

The basic workplace stressors are:

- ▶ the job itself – boring or repetitive, unrealistic performance targets or insufficient training, job insecurity or fear of redundancy;

- ▶ individual responsibility – ill-defined roles as much responsibility with too little power to the job outputs;
- ▶ working conditions – cramped, dirty and unsafe workplace; unsafe practices; lack of privacy; security; inadequate welfare facilities; threat of violence; excessive noise, vibration or heat; lighting; lack of flexibility in working hours to domestic requirements and adverse weather conditions for those working outside;
- ▶ management attitudes – poor communication; consultation or supervision, negative health and safety culture, lack of support in a crisis;
- ▶ relationships – unhappy relationship between workers, bullying, sexual and racial harassment.

Control measures

Possible solutions to all these stressors have been addressed throughout this book and involve the creation of a positive health and safety culture, effective training and consultation procedures and a set of health and safety arrangements which work on a day-to-day basis. The HSE has produced its own stress audit survey tool which is available free of charge on its website and advises the following action plan:

- ▶ identify the problem;
- ▶ identify the background to the problem and how it was discovered;
- ▶ identify the remedial action required and give reasons for that action;
- ▶ identify targets and reasonable target dates;
- ▶ agree a review date with employees to check that the remedial action is working.

The following additional measures have also been found to be effective by some employers:

- ▶ take a positive attitude to stress issues by becoming familiar with its causes and controls;

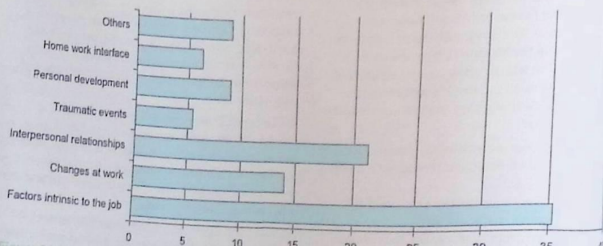


Figure 14.13 Breakdown of mental health cases by type of event which precipitated stress between 2010 and 2012

- ▶ take employees' concerns seriously and develop a counselling system which will allow a frank, honest and confidential discussion of stress-related problems;
- ▶ develop an effective system of communication and consultation and ensure that periods of uncertainty are kept to a minimum;
- ▶ set out a simple policy on work-related stress and include stressors in risk assessments;
- ▶ ensure that employees are given adequate and relevant training and realistic performance targets;
- ▶ develop an effective employee appraisal system which includes mutually agreed objectives;
- ▶ discourage employees from working excessive hours and/or missing break periods (this may involve a detailed job evaluation);
- ▶ introduce job rotation and increase job variety;
- ▶ develop clear job descriptions and ensure that the individual is matched to them;
- ▶ encourage employees to improve their lifestyle (e.g. many local health authorities provide smoking cessation advice sessions);
- ▶ monitor incidents of bullying, sexual and racial harassment and, where necessary, take disciplinary action;
- ▶ train supervisors to recognise stress symptoms among the workforce;
- ▶ avoid a blame culture over accidents and incidents of ill-health.

The individual can also take action if he/she feels that he/she is becoming over-stressed. Regular exercise, change of job, review of diet and talking to somebody, preferably a trained counsellor, are all possibilities.

Workplace stress has no specific health and safety regulations but is covered by the duties imposed by the Health and Safety at Work Act and the Management of Health and Safety at Work Regulations to:

- ▶ ensure so far as is reasonably practicable that workplaces are safe and without risk to health;
- ▶ carry out a risk assessment relating to the risks to health;
- ▶ introduce and maintain appropriate control measures.

The risk assessment will need to relate to the individual, such as absentee record, production performance and which of the stressors are applicable, and to the organisation, such as training programmes, communication and appraisal procedures. Many stressful conditions can be reduced by an effective 'whistle-blowing' policy that enables individuals to highlight any concerns to senior managers or directors in a confidential manner.

There have been several successful civil actions for compensatory claims resulting from the effects of

workplace stress. The Court of Appeal in the case of *Sutherland v. Hatton and others* in 2002 set out a number of practical propositions for future claims concerning workplace stress:

- ▶ Employers are entitled to take what they are told by employees at face value unless they have good reason to think otherwise. They do not have a duty to make searching enquiries about employee's mental health.
- ▶ An employer will not be in breach of duty in allowing a willing employee to continue in a stressful job if the only alternative is to dismiss or demote them. The employee must decide whether to risk a breakdown in their health by staying in the job.
- ▶ Indications of impending harm to health at work must be clear enough to show an employer that action should be taken, in order for a duty on an employer to take action to arise.
- ▶ The employer is in breach of duty only if he/she fails to take steps which are reasonable, bearing in mind the size of the risk, gravity of harm, the cost of preventing it and any justification for taking the risk.
- ▶ No type of work may be regarded as intrinsically dangerous to mental health.
- ▶ Employers who offer a confidential counselling advice service, with access to treatment, are unlikely to be found in breach of duty.
- ▶ Employees must show that illness has been caused by a breach of duty, not merely occupational stress.
- ▶ Compensation will be reduced to take account of pre-existing conditions or the chance that the claimant would have fallen ill in any event.

Their full guidelines should be consulted and consist of 16 points. However, more recent Court of Appeal decisions have suggested that the provision of a confidential counselling advice service alone may not be enough to discharge an employer's duty where an employee's problems could only be addressed by the intervention of management.

Stress usually occurs when people feel that they are losing control of a situation. In the workplace, this means that the individual no longer feels that they can cope with the demands made on them. Many such problems can be partly solved by listening to rather than talking at people. Many organisations have found that the active participation of union and employee representatives is a critical component in delivering improvements in employee health and well-being.

14.5 Further information

Statutory provisions

The Control of Noise at Work Regulations 2005

The Control of Vibration at Work Regulations 2005

The Ionising Radiations Regulations 1999
 The Personal Protective Equipment at Work Regulations 1992 (as amended)

Other references

Controlling Noise at Work, The Control of Noise at Work Regulations, Guidance on Regulations, second edition 2005, L108, HSE Books, ISBN 978-0-7176-6164-4 www.hse.gov.uk/pubns/priced/l108.pdf

Health and Safety Toolbox, online resource, HSE, www.hse.gov.uk/toolbox/index.htm

Hand-arm vibration, Control of Vibration at Work Regulations 2005, Guidance on Regulations, L140, HSE Books, ISBN 978-0-7176-6125-1 www.hse.gov.uk/pubns/priced/l140.pdf

HSE Stress Management Standards www.hse.gov.uk/stress/standards

Managing the causes of work-related stress, A step by step approach to using the management standards, HSG218, second edition 2007, HSE Books, ISBN 978-0-7176-6273-9 www.hse.gov.uk/pubns/priced/hsg218.pdf

Personal Protective Equipment at Work (second edition), Personal Protective Equipment at Work Regulations 1992 (as amended), Guidance on Regulations, HSE Books, ISBN 978-0-7176-6139-3 www.hse.gov.uk/pubns/priced/l25.pdf

Radon in the workplace: <http://www.hse.gov.uk/radiation/ionising/radon.htm#testingradon>

Upper Limb Disorders in the Workplace – A Guide, second edition 2002, HSG60, HSE Books, ISBN 978-0-7176-1978-8 www.hse.gov.uk/pubns/priced/hsg60.pdf

Whole-body vibration; The Control of Vibration at Work Regulations 2005, Guidance on Regulations, L141, HSE Books, ISBN 978-0-7176-6126-8 www.hse.gov.uk/pubns/priced/l141.pdf

14.6 Practice revision questions

- Outline** the mechanism by which noise is transmitted by the human ear to the brain.
 - Explain** the following terms in relation to noise exposure at work in both the short and long term:
 - 'noise-induced hearing loss'
 - 'tinnitus'
 - temporary and permanent threshold shift.
 - Outline** the options that might be considered to reduce the risk of hearing damage to workers who are exposed to high levels of noise.
- Give** the meaning of the following terms used in noise measurement:
 - frequency,
 - 'daily personal noise exposure' ($L_{EP,d}$),
 - decibel (dB),
 - 'A' Weighting.
 - Noise action levels are used to limit the exposure of workers to excessive noise levels. **Explain** the difference between a noise exposure value and a noise exposure limit value.
 - Identify TWO** types of noise measurement techniques.
- Outline** appropriate control measures to reduce the levels of noise to which the workers are exposed.
 - Outline** the criteria that should be used when selecting suitable hearing protection and **identify** the limitations of such protective equipment.
- Outline** the contents of a health surveillance programme required to protect workers who are regularly exposed to high noise levels.
- Explain** the meaning of the following terms in relation to noise control in the workplace:
 - silencing
 - absorption
 - damping
 - isolation
 - lagging.
 - Describe** hand-arm vibration (HAV) and whole-body vibration (WBV).
 - Outline** the ill-health effects and the associated symptoms caused by the exposure of workers to HAV and WBV.
- A worker operates a hammer drill for long periods of the working day.

 - Outline** the issues to be considered when assessing the risk of hand-arm vibration syndrome (HAVS) being developed by the worker.
 - Outline** the control measures that should be taken to minimise the risk of the worker developing HAVS.
- A dumper truck driver, working on a construction site, spends much of the working day driving on very rough ground. After several weeks, the driver complains of back pain.

 - Identify** possible reasons for the back pain associated with the truck driving.

- (b) **Outline** actions that could be taken by the employer to control the risks from whole-body vibration.
8. (a) **Identify TWO** types of ionising radiation.
(b) **Outline** possible means of ensuring that workers are not exposed to unacceptable levels of ionising radiation.
9. (a) For each of the following types of non-ionising radiation, **identify** a source and the possible ill-health effects on exposed individuals:
(i) infrared radiation
(ii) ultraviolet radiation
(iii) lasers
(iv) microwaves.
(b) **Identify** the controls available to protect people against exposure to these non-ionising radiations.
10. Construction workers are often required to work outdoors in a variety of weather conditions. **Outline** the hazards and the associated control measures that should be taken to protect these workers when they are working outdoors:
(a) in strong sunlight;
(b) in cold temperatures.
11. (a) **Explain** the meaning of 'work-related stress'.
(b) **Identify** the ill-health effects of excessive stress to workers in the workplace.
(c) **Identify FOUR** issues that could lead to workplace stress.
(d) **Outline** the control measures that could be taken to minimise the risk of occupational stress.

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15.28	Safety Representatives and Safety Committees Regulations 1977	▶ 511
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15.30	The Supply of Machinery (Safety) Regulations 2008 as amended	▶ 515
15.31	Control of Vibration at Work Regulations 2005	▶ 516
15.32	Workplace (Health, Safety and Welfare) Regulations 1992 as amended in 2002 and 2013	▶ 518
15.33	Work at Height Regulations 2005 as amended in 2007	▶ 520
15.34	The Waste (England and Wales) Regulations 2011	▶ 524
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This chapter contains:

1. An outline of the Health and Safety at Work (HSW) Act and The Environmental Protection Act and associated regulations
2. Summaries of over 30 sets of regulations mainly made under the HSW Act which are covered by the NEBOSH (National Examination Board in Occupational Safety and Health) General Certificate syllabus
3. A summary of the Regulatory Reform (Fire Safety) Order
4. A very brief summary of over 17 other sets of regulations which are of interest to managers and students
5. Further information after each piece of legislation

15.1 Introduction

The achievement of an understanding of the basic legal requirements can be a daunting task. However, the health and safety student should not despair, because at NEBOSH National Certificate level they do not need to know the full history of UK health and safety legislation, the complete range of regulations made under the HSW Act 1974 or the details of the appropriate European Directives. These summaries, which are correct up to April 2015, cover those acts and regulations which are required for the Certificate student and will provide the

essential foundation of knowledge. Students should check the latest edition of the NEBOSH Certificate guide to ensure that the regulations summarised here are the latest for the course being undertaken.

Many managers and other students will find these summaries a useful quick reference to health and safety legal requirements. However, anyone involved in achieving compliance with legal requirements should ensure they read the regulations themselves, any approved codes of practice and Health and Safety Executive (HSE) guidance.

15.2 The legal framework

15.2.1 General

The HSW Act is the foundation of British health and safety law. It describes the general duties that employers have towards their employees and to members of the public, and also the duties that employees have to themselves and to each other.

The term 'so far as is reasonably practicable' (sfaipr) qualifies some of the duties in some sections, notably 2, 3, 4 and 6 of the HSW Act. In other words, the degree of risk in a particular job or workplace needs to be balanced against the time, trouble, cost and physical difficulty of taking measures to avoid or reduce the risk.

The law simply expects employers to behave in a way that demonstrates good management and common sense. They are required to look at what the hazards are and take sensible measures to control/reduce the risks from them.

The Management of Health and Safety at Work Regulations 1999 (MHSWR) (the Management Regulations) give employers specific requirements to manage health and safety under the HSW Act. Like the Act, they apply to every work activity.

The MHSW Regulations require every employer to carry out risk assessments. If there are five or more employees in the workplace, the significant findings of the risk assessments need to be recorded.

In a place like an office, risk assessment should be straightforward; but where there are serious hazards, such as those in a chemical plant, laboratory or an oil rig, it is likely to be more complicated.

In October 2010 Lord Young published his report entitled, *Common Sense Common Safety*, which stated that:

'The aim is to free businesses from unnecessary bureaucratic burdens and the fear of having to pay out unjustified damages claims and legal fees. Above all it means applying common sense not just to compensation but to everyday decisions once again.'

Some effects of this report became evident fairly quickly during 2011 with the introduction of: The Occupational Safety Consultants Register in January 2011; 20-minute risk assessments for low risk offices; a review of the information reported under RIDDOR and move to reporting to 7 days for 3 days plus lost time injuries; Police and Fire Services – police and fire-fighters not to be at risk of investigation or prosecution when committing a heroic act.

To read the full report, go to <http://news.hse.gov.uk/2010/10/15/lord-young-report/>.

Subsequently in March 2011 the then Employment Minister Chris Grayling commissioned an independent review and appointed Professor Ragnar Löfstedt –

Director of the King's Centre for Risk Management at King's College, London – to chair it.

Professor Löfstedt made recommendations in November 2011 aimed at reducing the burden of unnecessary regulation on businesses while maintaining Britain's health and safety performance, which is among the best internationally. The Government accepted his recommendations. As of April 2015 significant work is still being undertaken to complete his recommendations which included changes to: Reporting of Injuries, Diseases and Dangerous Occurrences (RIDDOR) (now RIDDOR 2013); exempting the self-employed whose work imposes no risk to others; amendment, consolidation or withdrawal of 30 Approved Codes of Practice; amendment of Construction (Design and Management) (CDM) Regulations (now CDM 2015); revocation of 14 regulatory measures including Construction (Head Protection), and Notification of Conventional Tower Cranes Regulations, and the changes to strict liability in Section 47 of the HSW Act 1974.

15.2.2 The relationship between the regulator and industry

In April 2008 the HSC and the HSE merged into a single unified body called the Health and Safety Executive (HSE). The HSE consults widely with those affected by its proposals.

The HSE has many contact points with industry and work through:

- ▶ the Industry and Subject Advisory Committees, which have members drawn from the areas of work they cover, and focus on health and safety issues in particular industries (such as the textile industry, construction and education or areas such as toxic substances and genetic modification);
- ▶ intermediaries, such as small firms' organisations providing information and advice to employers and others with responsibilities under the HSW Act;
- ▶ guidance to enforcers, both the HSE inspectors and those of local authorities (LAs);
- ▶ the day-to-day contact which inspectors have with people at work.

The HSE consults with small firms through Small Firms Forums. It also seeks views in detail from representatives of small firms about the impact on them of proposed legislation.

15.2.3 Health and safety in Scotland

Although occupational health and safety is a reserved issue (i.e. not devolved to the Scottish Executive (SE)), there are some significant differences with some issues. The following extracts from the concordat between the HSE and the SE outline some of these issues.

Extracts from The Concordat between the Health and Safety Executive and the Scottish Executive

Introduction

1. This concordat is an agreement between the Scottish Executive and the Health and Safety Executive. It is intended to provide the framework to guide the future working relationship between the Health and Safety Executive (HSE) and the Scottish Executive (SE). The objective of the concordat is to ensure that the roles and responsibilities of the HSE and the SE in the new constitutional structure are effectively translated into practical working arrangements between the two organisations. The aim is to promote the establishment of close and harmonious working relationships and good communications at all levels between the HSE and the SE, and in particular to foster constructive cooperation.

Most day to day liaison between the SE and HSE will, in the first instance be handled by HSE's Director for Scotland, based in Edinburgh.

[Note: where the concordat referred to HSC/E this has been changed to HSE meaning the new combined Authority.]

Nature of concordat

3. This concordat is a voluntary arrangement between the HSE and the SE. It is not a binding agreement or contract and so does not create any legally enforceable rights, obligations, or restrictions. It is intended to be binding in honour only. The HSW Act provides for statutory consultation in connection with proposals for regulatory change; this concordat does not create any other right to be consulted or prevent consultation beyond that required by statute. Any failure to follow the terms of the concordat is not to be taken as invalidating decisions taken by the HSE or the Scottish Executive.

Consultation

11. There are a significant number of areas where the HSE and Scottish Ministers share or have closely related interests, as set out in the Annex. The HSE and the SE recognise that the extent of these areas makes good communications essential in order to assist the process of policy formation and decision-making in each administration and to meet any consultation or other requirements connected

with the exercise of a function. They also recognise that there will be mutual benefit from the exchange of information on both technical and, where appropriate, policy matters.

12. Information obtained by use of the HSE's statutory powers cannot be made available to SE where the release of that information is not for the purposes of the HSE's functions. Subject to that, the HSE and the SE will:
- ▶ share relevant information, analysis and research;
 - ▶ inform each other of any relevant information which comes to their attention which may require action or have resource consequences for the other party;
 - ▶ seek to involve each other, as and when appropriate, in policy development on all topics where there is a reasonable expectation that a policy initiative might affect the other's responsibilities, or be used or adapted by the other;
 - ▶ inform each other at the earliest practicable stage of any emerging proposal to change primary or secondary legislation which might have an impact upon the other's responsibilities;
 - ▶ inform each other at the earliest practicable stage of substantive new policy announcements which may be relevant to the other's responsibilities; and
 - ▶ coordinate activities where appropriate.

Local authorities

16. The constitution of Scottish local authorities which includes their establishment, dissolution, assets, liabilities, funding and receipts, is a devolved matter in which the Scottish Ministers have a policy interest as are most functions conferred upon such authorities. The HSE has an interest in the functions of local authorities under health and safety legislation, and under section 18(4) of HSWA, the Commission may issue guidance to local authorities, as enforcing authorities which they must follow. The HSE will consult the SE in advance where proposed changes in health and safety legislation, or directions under section 18(4) might result in new burdens being imposed upon Scottish local authorities.

ANNEX – areas of common and closely related interest – extracts only

This annex lists subjects in which the Scottish Ministers and the HSE share an interest and

areas where there may be a particular need for consultation between the HSE and the Scottish Executive.

Building control

This is a devolved matter, but the HSE has an interest in the related matter of construction safety.

Dangerous substances

The HSE have an interest under the HSW Act 1974 and the European Communities Act 1972 in the control of the keeping, notification, supply and use of explosive or highly flammable or otherwise dangerous substances which have the potential to create a major accident and in the prevention of the unlawful acquisition, possession and use of such substances. The HSE also has an interest in the carriage by road and rail of dangerous and environmentally hazardous goods. The Scottish Ministers, however, have an interest in such matters for the purposes of protection of the environment and the planning system (by virtue of the Planning (Hazardous Substances) (Scotland) Act 1997). The HSE will continue to advise what hazardous substances and in what quantities have significant risk off site. HSE involvement in individual hazardous substances consent/planning applications which are before Scottish Ministers for a decision will be on the basis of established planning and related public inquiry procedures.

Educational facilities; adventure activity centres

The safety of these premises is generally a devolved matter. However, the HSE has interests in the safety of adventure activity centres because of its responsibilities by virtue of the Activity Centres (Young Persons Safety) Act 1995 and subordinate legislation made under that Act. It also has an interest in the health and safety of workers and those affected by the activities of workers in these premises.

Fire safety

General fire safety is a devolved matter and the policy responsibility of the Scottish Ministers. However, the HSE has an interest in the reserved matters of process fire precautions, fire precautions in relation to petroleum and petroleum spirit, fire safety on construction sites, ships under construction or repair by persons other than the master or crew, in mines, on offshore installations, and on any other premises which on 1 July 1999 are of a description specified in Part I of Schedule 1 to the Fire Certificates (Special Premises) Regulations 1976.

Food safety

This is generally a devolved matter and the policy responsibility of the Scottish Ministers. However, the HSE has an interest in the safety of workers in the food processing, manufacturing, cooking and food distribution industries and in related risks to the public.

Local authorities

The Scottish Ministers have an interest in the devolved matter of the constitution of Scottish local authorities, which includes their establishment, dissolution, assets, liabilities, funding and receipts. The HSE has an interest in the functions and performance of local authorities in relation to the enforcement of health and safety legislation.

Pesticides (including biocides and plant protection products)

The Scottish Ministers' interest is in the protection of the environment, public health, animal and plant health and food safety. The HSE's interest is in the protection of workers and those affected by the activities of workers, protection of the environment, and product approvals.

Places of entertainment (cinemas, theatres, casinos, dance-halls etc), sports facilities, sports events and zoos

The Scottish Ministers' interest is in public safety, fire safety, structural building standards, sanitation, food standards, pest control, security, etc. The HSE has an interest in the safety of workers and the safety of members of the public and others affected by work activity.

Ports, harbours and inland waterways

Scottish Ministers' interest is in ports policy and communications via the various ferry links between mainland Scotland and the islands. Responsibility for safety enforcement for the ships and their crews rests with the Maritime and Coastguard Agency. The HSE has an interest in the safety of workers and the safety of members of the public and others affected by work activity at inland waterways, the safety aspects of new harbour byelaws and the health and safety of shore side workers loading or unloading from berthed ships or the dock side.

Protection of the environment

This is a devolved matter and the policy responsibility of the Scottish Ministers. Responsibility for enforcement of much environmental legislation in Scotland rests

with the Scottish Environment Protection Agency. However, the HSE has enforcement responsibilities for certain environmental legislation under agency arrangements under section 13 of HSWA.

Public health, occupational health and health promotion

Public health is generally a devolved matter and the policy responsibility of the Scottish Ministers. Occupational Health is a reserved matter for the HSE. General health promotion in Scotland is a devolved matter and the policy responsibility of the Scottish Ministers, but the HSE has an interest in 'lifestyle' issues such as misuse of drugs, alcohol and smoking (see also below), when these impinge on the workplace.

Rail safety

This is a reserved matter. However, the Scottish Ministers have an interest because of their executive devolved functions in relation to a number of aspects of the regulation of the rail industry in Scotland. The HSE has an interest in any matter which could have an impact on its responsibility for the approval of new and altered works on railways, light rail and tramways.

Smoking

The regulation of smoking and passive smoking in workplaces is a reserved matter. However, the Scottish Ministers have an interest. Other aspects of smoking such as the regulation of tobacco advertising are generally devolved and are the policy responsibility of the Scottish Ministers.

Water and sewerage

This is generally a devolved matter and the policy responsibility of the Scottish Ministers. Water and sewerage services in Scotland are provided by three publicly owned water authorities. The HSE's interest is in matters relating to the safety of workers and those affected by the activities of workers.

15.2.4 Health and Safety in Northern Ireland

The Health and Safety at Work (Northern Ireland) Order 1978 SI 1978/1039 (NI 9) <http://www.legislation.gov.uk/nisi/1978/1039/contents> effectively apply the Great Britain, Health and Safety at Work Act 1974 to Northern Ireland. The Health and Safety at Work (Amendment) (Northern Ireland) Order 1998 SI 1998/2795 (NI 18) established the Health and Safety Executive for Northern Ireland.

Much of the subordinate legislation made under the HSW Act has been transcribed into NI regulations under the 1978 Order. For example the Management of Health and Safety at Work Regulations (Northern Ireland) 2000. For a full list see <http://www.hse.gov.uk/resources/legislation.htm>

This also applies to many ACoPs made under the GB HSW Act, which have been approved for use in Northern Ireland. A list is available at <http://www.hse.gov.uk/resources/legislation.htm>. In addition there are a number of NI ACoPs which have been adopted separately from GB but these also follow closely the GB legislation.

15.3 List of Acts, orders and regulations summarised

The following Acts and regulations are covered in this summary:

- The HSW Act 1974;
- Enterprise and Regulatory Reform Act 2013 (Statutory Liability issues only)
- The Health and Safety at Work etc. Act 1974 (Civil Liability) (Exceptions) regulations 2013
- The Health and Safety (Fees) Regulations 2012
- The Environmental Protection Act (EPA) 1990.

Most of the relevant regulations covering health and safety at work have been made under the HSW Act since 1974. Those relevant to the Certificate studies are listed here and summarised in this chapter. The list is alphabetical and some titles have been modified to allow an easier search. The second list is chronological with Statutory Instrument (SI) numbers.

The Classification, Labelling and Packaging of Substances and Mixtures Regulation are an EU Regulation which do not need member state regulations to be made. The Regulatory Reform (Fire Safety) Order 2005 was made under the Regulatory Reform Act 2001. The Hazardous Waste Regulations under the EPA 1990. The regulations/orders covered are as follows.

15.3.1 Alphabetical list of regulations and orders summarised

- Control of Artificial Optical Radiation at Work Regulations 2010;
- Classification, Labelling and Packaging of Substances and Mixtures Regulations (European) adopting into EU UN Globally Harmonised System of Classification and Labelling of Chemicals (GHS)
- Confined Spaces Regulations 1997;
- Construction (Design and Management) Regulations 2015;
- Health and Safety (Consultation with Employees) Regulations 1996;
- Control of Substances Hazardous to Health Regulations 2002 and 2004 Amendment;

Dangerous Substances and Explosive Atmospheres Regulations 2002;

Health and Safety (Display Screen Equipment) Regulations 1992;

Electricity at Work Regulations 1989;

Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998;

The Regulatory Reform (Fire Safety) Order 2005 including:

Fire Safety (Employees' Capabilities) (England) Regulations 2010,

Fire Safety (Employees' Capabilities) (Wales) Regulations 2012;

Fire (Scotland Act) 2005;

Police and Fire Reform (Scotland) Act 2012;

Health and Safety (First Aid) Regulations 1981 as amended 2013;

Hazardous Waste (England and Wales) Regulations 2005;

Health and Safety (Information for Employees) Regulations 1989;

Ionising Radiations Regulations 1999;

Lifting Operations and Lifting Equipment Regulations 1998;

Management of Health and Safety at Work Regulations 1999 as amended;

Manual Handling Operations Regulations 1992 as amended;

Control of Noise at Work Regulations 2005;

Personal Protective Equipment at Work Regulations 1992 as amended;

Provision and Use of Work Equipment Regulations 1998 (except Part IV – Power Presses) as amended;

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013;

Safety Representatives and Safety Committees Regulations 1977;

Health and Safety (Safety Signs and Signals) Regulations 1996;

Supply of Machinery (Safety) Regulations 2008 and amendments;

Vibration at Work Regulations 2005;

Waste (England and Wales) Regulations 2011 as amended in 2012;

Workplace (Health, Safety and Welfare) Regulations 1992 as amended;

Work at Height Regulations 2005.

The following acts and regulations have also been included. With a few exceptions like the Road Traffic Acts, they are generally not in the NEBOSH General Certificate syllabus. Brief summaries only are given.

Building Regulations 2010 Approved Documents B & M;

Compensation Act 2006;

Control of Asbestos Regulations 2012;

Corporate Manslaughter and Corporate Homicide Act 2007;

Electrical Equipment (Safety) Regulations 1994;

Equality Act 2010 Disability Regulations 2010;

Gas Appliances (Safety) Regulations 1992;

Gas Safety (Installation and Use) Regulations 1998;

Health and Safety (Offences) Act 2008;

Lead at Work Regulations 2002;

Occupiers Liability Acts 1957 and 1984;

Personal Protective Equipment Regulations 2002;

Pesticides Regulations 1986;

Pressure Systems Safety Regulations 2000;

Road Traffic Acts 1988 & 1991;

Sharp Instruments in Healthcare Regulations 2013;

Smoke-free Regulations 2006;

Working Time Regulations 1998, 2001, 2003 and 2007.

15.3.2 Chronological list of regulations/orders summarised

The list below gives the correct titles, year produced and SI number.

Year	SI number	Title
1977	0500	Safety Representatives and Safety Committees Regulations
1981	0917	Health and Safety (First Aid) Regulations
1989	0635	Electricity at Work Regulations
1989	0682	Health and Safety (Information for Employees) Regulations
1992	2792	Health and Safety (Display Screen Equipment) Regulations
1992	2793	Manual Handling Operations Regulations
1992	2966	Personal Protective Equipment at Work Regulations
1992	3004	Workplace (Health, Safety and Welfare) Regulations
1996	0341	Health and Safety (Safety Signs and Signals) Regulations
1996	1513	Health and Safety (Consultation with Employees) Regulations
1997	1713	Confined Spaces Regulations
1998	2306	Provision and Use of Work Equipment Regulations (except Part IV – Power Presses)
1998	2307	Lifting Operations and Lifting Equipment Regulations
1998	2573	Employers Liability (Compulsory Insurance) Regulations
1999	437	Control of Substances Hazardous to Health Regulations
1999	3232	Ionising Radiations Regulations
1999	3242	Management of Health and Safety at Work Regulations
2002	2677	Control of Substances Hazardous to Health Regulations
2002	2776	Dangerous Substances and Explosive Atmospheres Regulations
2004	3386	Control of Substances Hazardous to Health (Amendment) Regulations
2005	asp 5	The Fire Scotland Act
2005	894	The Hazardous Waste (England and Wales) Regulations

2005	735	Work at Height Regulations
2005	1541	The Regulatory Reform (Fire Safety) Order
2005	1093	Control of Vibration at Work Regulations
2008	1597	The Supply of Machinery (Safety) Regulations
2008	EC No 1272	European Regulation on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation)
2010	1140	The Control of Artificial Optical Radiation at Work Regulations
2011	968	The Waste (England and Wales) Regulations as amended 2012
2012		The Health and Safety (Fees) Regulations (Regs 23-25)
2013	1471	The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
2013	1667	The Health and Safety at Work etc. Act 1974 (Civil Liability) (Exceptions) Regulations
2015		Construction Design and Management Regulations

2010	Ch 15	Equality Act
2010	2128	The Equality Act 2010 (Diversity) Regulations
2012	Asp8	Police and Fire Reform (Scotland) Act 2012
2012	632	The Control of Asbestos Regulations 2012
2012	1085 (W133)	The Fire Safety (Employers' Duties) (England) Regulations 2012
2013	645	The Health and Safety (Construction) (Safety) Regulations 2013
2013	C24	Enterprise and Regulatory Reform Act 2013 (Strict Liability Changes only)

15.4 HSW Act 1974 as amended in 2015

The HSW Act was introduced to provide a comprehensive and integrated piece of legislation dealing with the health and safety of people at work and the protection of the public from work activities.

The Act imposes a duty of care on everyone at work related to their roles. This includes employers, employees, owners, occupiers, designers, suppliers and manufacturers of articles and substances for use at work. It also includes self-employed people. The detailed requirements are spelt out in Regulations.

The Act basically consists of four parts.

Part 1 covers:

- ▶ the health and safety of people at work;
- ▶ protection of other people affected by work activities;
- ▶ the control of risks to health and safety from articles and substances used at work.

Part 2 sets up the Employment Medical Advisory Service.

Part 3 makes amendments to the safety aspects of building regulations.

Part 4 consists of general and miscellaneous provisions.

15.4.1 Duties of employers – section 2

The employers' main general duties are to ensure that work is carried out in a safe and sound manner, the health, safety and welfare at work of all employees, in particular:

- ▶ the provision of safe plant and systems of work;
- ▶ the safe use, handling, storage and transport of articles and substances;
- ▶ the provision of any required information, instruction, training and supervision;
- ▶ a safe place of work including safe access and egress; and
- ▶ a safe working environment with adequate welfare facilities.

When five or more people (The Employer's Health and Safety Policy Statements (Exception) Regulations 1999 (SI No. 1584) exempted an employer who employs fewer than five people) are employed the employer must

Very brief summaries only for:

Year	SI number	Title
1957	Ch 31	Occupiers Liability Act
1984	Ch 3	Occupiers Liability Act
1986	1510	Control of Pesticides Regulations
1988	Ch52	Road Traffic Act
1991	Ch40	Road Traffic Act
1994	3260	Electrical Equipment (Safety) Regulations
1995	1629	Gas Appliances (Safety) Regulations
1998	2451	Gas Safety (Installation and Use) Regulations
1998	1833	Working Time Regulations
1999	743	The Control of Major Hazards Regulations and amendments
2000	128	Pressure Systems Safety Regulations
2002	1144	Personal Protective Equipment Regulations
2002	2676	The Control of Lead at Work Regulations
2003	1684	Working Time (Amendment) Regulations
2006	Ch 29	Compensation Act
2006	3368	Smoke-free (Premises and Enforcement) Regulations
2006	090	Scottish SI – The Prohibition of Smoking in Certain Premises (Scotland) Regulations
2007	W 68	The Smoke-free Premises etc. (Wales) Regulations
2007	Ch 19	Corporate Manslaughter and Corporate Homicide Act
2008	Ch 20	Health and Safety (Offences) Act
2010	471	The Fire Safety (Employers' Duties) (England) Regulations
2010	2214	The Building Regulations Approved Documents B and M

prepare a written general health and safety policy; set down the organisation and arrangements for putting that policy into effect; revise and update the policy as necessary; bring the policy and arrangements to the notice of all employees.

Employers must also:

- consult safety representatives appointed by recognised trade unions;
- consult safety representatives elected by employees;
- establish a safety committee if requested to do so by recognised safety representatives.

5.4.2 Duties of owners/occupiers – sections 3 and 4

Every employer and self-employed person (a self-employed person must be one who conducts an undertaking of a prescribed description; this can be any type of activity carried out or any other feature or whether a person's health and safety may be affected by the undertaking) is under a duty to conduct their undertaking in such a way as to ensure, so far as is practicable, that persons not in their employment (and themselves if self-employed), who may be affected, are not exposed to risks to their health and safety.

Those in control of non-domestic premises have a duty to ensure, so far as is practicable, that the premises, the means of access and exit, and any plant or substances are safe and without risks to health. The common parts of residential premises are non-domestic.

Note: Section 5 was repealed by the EPA 1990.

5.4.3 Duties of manufacturers/suppliers – section 6

Persons who design, manufacture, import or supply any article or substance for use at work must ensure, so far as is practicable, that:

- it is safe and without risks to health when properly used (i.e. according to manufacturers' instructions);
- they carry out such tests or examinations as are necessary for the performance of their duties;
- they provide adequate information (including instructions) to perform their duties;
- they carry out any necessary research to discover, eliminate or minimise any risks to health or safety;
- the installer or erector has done nothing regarding the way in which the article has been installed or erected to make it unsafe or a risk to health.

5.4.4 Duties of employees – section 7

Four main duties are placed on employees:

- to take reasonable care for the health and safety of themselves and others who may be affected by their acts or omissions at work;

- ▶ to cooperate with their employer and others to enable them to fulfil their legal obligations.

15.4.5 Other duties – sections 8 and 9

No person may misuse or interfere with anything provided in the interests of health, safety or welfare in pursuance of any of the relevant statutory provisions.

Employees cannot be charged for anything done, or provided, to comply with the relevant statutory provisions. For example, employees cannot be charged for personal protective equipment (PPE) required by health and safety legislation.

15.4.6 Powers of inspectors – sections 20–25

Inspectors appointed under this Act have the authorisation to enter premises at any reasonable time (or anytime in a dangerous situation), and to:

- ▶ take a constable with them if necessary;
- ▶ take with them another authorised person and necessary equipment;
- ▶ examine and investigate;
- ▶ require premises or anything in them to remain undisturbed for purposes of examination or investigation;
- ▶ take measurements, photographs and recordings;
- ▶ cause an article or substance to be dismantled or subjected to any test;
- ▶ take possession of or retain anything for examination or legal proceedings;
- ▶ if practical to do so take samples as long as a comparable sample is left behind;
- ▶ require any person who can give information to answer questions and sign a statement. Evidence given under this Act cannot be used against that person or their spouse;
- ▶ require information, facilities, records or assistance;
- ▶ do anything else necessary to enable them to carry out their duties;
- ▶ issue an **Improvement Notice(s)**, which is a notice identifying a contravention of the law and specifying a date by which the situation is remedied. If an appeal is to be made, the appeal procedure must be triggered within 21 days. The notice is suspended pending the outcome of the appeal;
- ▶ issue a **Prohibition Notice(s)**, which is a notice identifying and halting a situation which involves or will involve a risk of serious personal injury to which the relevant statutory provisions apply. A contravention need not have been committed. The notice can have immediate effect or be deferred, for example to allow a process to be shut down safely. Again there is provision to appeal against the notice but the order still stands until altered or rescinded by an employment tribunal;

- ▶ initiate prosecutions;
- ▶ seize, destroy or render harmless any article or substance which is a source of imminent danger to health and safety.

15.4.7 Offences – Section 33

The Health and Safety (Offences) Act 2008, increases penalties and provides courts with greater sentencing powers for those who flout health and safety legislation and the range of offences for which an individual can be imprisoned has been broadened.

Further under The Legal Aid, Sentencing and Punishment of Offenders Act 2012 section 85(1) from 12th March 2015 Magistrates courts can issue unlimited fines.

There are strict guidelines which are observed by the regulators in their approach to the prosecution of health and safety offences. The HSE Enforcement Policy Statement makes it clear that prosecutions should be in the public interest and where one or more of a list of circumstances apply. These include where:

- ▶ death was a result of a breach of the legislation;
- ▶ there has been reckless disregard of health and safety requirements;
- ▶ there have been repeated breaches which give rise to significant risk, or persistent and significant non-compliance;
- ▶ false information has been supplied with intent to deceive in relation to a matter which gives rise to significant risk.

Summary of penalties under the HSW Act 1974

Maxima (from 12 March 2015):

Unlimited fines in Magistrates courts for summary offences, unlimited fines in the Crown Court

Imprisonment for nearly all offences – up to 6 months in Magistrates Courts (until 12 March 2015) and two years in the Crown Court.

Table 15.1 Summary of maximum penalties under Health and Safety (Offences) Act 2008 and The Legal Aid, Sentencing and Punishment of Offenders Act 2012 for offences committed on or after 12 March 2015

Section and contravention	Magistrates' Court	Crown Court
S 33(1)(a) – S2–S6	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
S 33(1)(a) – S7	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(b) – S8	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(b) – S9	Unlimited fine	Unlimited fine
(c) – any H & S regulations	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(d) – relating to S14 enquiries	Unlimited fine (Level 5)	Summarily only
(e) – any requirement imposed by Inspector under S20 & S25	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(f) – attempting to / preventing a person speaking to Inspector	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(g) – contravention of a PN or IN	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(h) – obstruction	Unlimited fine (Level 5) and/or 6 months imprisonment**	Summarily only
(i) – relating to S27	Unlimited fine	Unlimited fine
(j) – disclosure in contravention to S26 and S27(4)	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(k) – false statement	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(l) – false entry in register	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(m) – use a document with intent to deceive	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
(n) – impersonating an inspector	Unlimited fine (Level 5)	Summarily only
(o) – relating to S42 orders	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment
Any other offence under existing statutory provisions	Unlimited fine and/or 6 months imprisonment*	Unlimited fine and/or 2 years imprisonment

* The maximum term of imprisonment that may be imposed by a Magistrates' Court is currently 6 months. When s154(1) of the Criminal Justice Act 2003 is brought into force the maximum term will be increased to 12 months

** The maximum term of imprisonment that may be imposed by a Magistrates' Court is currently 6 months. When s281(5) of the Criminal Justice Act 2003 is brought into force the maximum term will be increased to 51 weeks in England and Wales or 12 months in Scotland.

Prosecutions of individuals by health and safety regulators are not undertaken lightly. Any prosecutions of individuals are subject to the same strict considerations set out above and are only taken if warranted, and not in lieu of a case against their employer.

If a regulation has been contravened, failure to comply with an Approved Code of Practice is admissible in evidence as failure to comply. Where an offence is committed by a corporate body with the knowledge, connivance or neglect of a responsible person, both that person and the body are guilty of the offence. In proceedings the onus of proving the limits of what is reasonably practicable rests with the accused.

On conviction of directors for indictable offences in connection with the management of a company, the courts may also make a disqualification order as follows.

Lower court maximum	5 years disqualification
Higher court maximum	15 years disqualification

15.4.8 The merged HSE – section 10

The majority of the proposals set out in the original Lord Robens' report were adopted in full and formed the basis of the HSW Act. However, contrary to Robens' recommendation, the HSW Act did not provide for a single authority, but two separate Crown Non-Department Public Bodies (NDPBs): the HSC and the HSE.

This recommendation was finally implemented and the HSC and the HSE merged on 1 April 2008 to form a single national regulatory body responsible for promoting the cause of better health and safety at work. The merged body is called the HSE and has provided greater clarity and transparency whilst maintaining its public accountability. Section 10 of the Act has been revised.

15.4.9 Civil liability – section 47

The Enterprise and Regulatory Reform Act 2013 removes the right of civil action against employers for breach of statutory duty in relation to health and safety at work regulations. This will address the potential unfairness that arises where an employer can be found liable to pay compensation to an employee despite having taken reasonable steps to protect them.

This unfairness was identified by Professor Löfstedt in his independent review of health and safety, 'Reclaiming Health and Safety for All' (November 2011) and arises where health and safety at work regulations impose a strict duty on employers, giving them no opportunity to defend themselves on the basis of having done all that was reasonable to protect their employees. The inability of employers to defend themselves in these cases helps fuel the perception of a compensation culture and the fear of being sued

is driving businesses to over-comply with regulations, resulting in additional unnecessary costs.

Previously, compensation claims for workplace injuries or illnesses could be brought by two routes: breach of statutory duty in which failure to meet a particular standard in law has to be proved, or breach of common law duty of care in which negligence has to be proved.

The Act amends the law so that compensation claims can only be made where negligence or fault on the part of the employer can be proved.

This change will help redress the balance of the civil litigation system in respect of health and safety at work legislation. It will help employers' confidence, allowing them to focus on a sensible and practical approach to health and safety and keep costs down by avoiding over-compliance.

Employees will continue to have the same level of protection, as the standards set out in criminal law will not change and they will still be able to claim compensation where an employer has been negligent.

The Health and Safety at Work etc. Act 1974 (Civil Liability) (Exceptions) Regulations 2013 create exceptions from the exclusion of civil liability for breach of statutory duty for pregnant workers and workers who have recently given birth or are breastfeeding ('new and expectant mothers').

15.4.10 Fees for Intervention

Fee for Intervention (FFI) is HSE's cost recovery regime implemented from 1 October 2012, under regulations 23 to 25 of the Health and Safety (Fees) Regulations 2012.

These Regulations put a duty on the HSE to recover its costs for carrying out its regulatory functions from those found to be in material breach of health and safety law.

Duty-holders who are compliant with the law, or where a breach is not material, will not be charged FFI for any work that the HSE does with them.

A material breach is when, in the opinion of the HSE inspector, there is or has been a contravention of health and safety law that requires them to issue notice in writing of that opinion to the duty-holder.

Written notification from an HSE inspector may be by a notification of contravention, an improvement or prohibition notice, or a prosecution and must include the following information:

- ▶ the law that the inspector's opinion relates to;
- ▶ the reasons for their opinion; and
- ▶ notification that a fee is payable to the HSE.

FFI applies to duty-holders where the HSE is the enforcing authority. This includes employers, self-employed people who put others (including their employees or members of the public) at risk, and some individuals acting in a capacity other than as an employee, e.g. partners. It includes:

- ▶ public and limited companies;
- ▶ general, limited and limited liability partnerships; and
- ▶ Crown and public bodies.

The fee payable by duty-holders found to be in material breach of the law is £124 per hour (April 2015). The total amount to be recovered will be based on the amount of time it takes the HSE to identify and conclude its regulatory action, in relation to the material breach (including associated office work), multiplied by the relevant hourly rate. This will include part hours.

15.4.11 Further information

An Introduction to Health and Safety: Guidance on Health and Safety for Small Firms INDG259 (rev 1), reprinted 2006, HSE Books, ISBN 978 0 7176 2685 4.

Health and Safety made simple The basics for your business INDG449, HSE Books, 2011, <http://www.hse.gov.uk/pubns/indg449.pdf>

Health and Safety at Work etc. Act 1974, chapter 37, London, The Stationery Office <http://www.legislation.gov.uk/ukpga/1974/37/contents>

15.5 Environmental Protection Act 1990

15.5.1 Introduction

The EPA 1990 is still the centrepiece of current UK legislation on environmental protection. It is divided into nine parts, corresponding to the wide range of subjects dealt with by the Act.

Integrated Pollution Control (IPC) was a system established by Part 1 of the Act. Part 1 introduced Part A Processes, which are the most potentially polluting or technologically complex processes. In England and Wales these are enforced by the Environment Agency. In Scotland there is a parallel system enforced by the Scottish Environment Protection Agency.

Less polluting industries were classified as Part B, with only emissions released to air being subject to regulatory control. For such processes LAs are the enforcing body and the system is known as Local Air Pollution Control (LAPC).

Both IPC and LAPC have now been replaced by an Integrated Pollution Prevention and Control (IPPC) regime that implements the requirements of the European Community (EC) Directive 96/61 on IPPC. This was introduced under the Pollution Prevention and Control Act of 1999 (1999, Chapter 24), which repealed Part 1 of the EPA.

The change is outlined in Box 15.1.

Box 15.1 Pollution prevention and regimes

PPC REGIME

Pollution prevention and control

IPC (regime A)	IPPC (regime A1 & A2)
Integrated pollution control	Integrated pollution prevention and control
LAPC (regime B)	LAPPC (regime B)
Local air pollution control	Local air pollution prevention and control

Under EPA 1990 Part 1

Regime A – This is an integrated permitting regime. Emissions to the air, land and water of the potentially more polluting processes are regulated. The Environment Agency is the regulator.

Regime B – This regime permits processes with a lesser potential for polluting emissions. Only emissions to the air are regulated. The Local Authority is the regulator.

Under Pollution Prevention and Control Act

Regime A1 – This is an integrated permitting regime. Emissions to the air, land and water of potentially more polluting processes are regulated. The Environment Agency is the regulator.

Regime A2 – This is an integrated permitting regime. Emissions to the air, land and water of processes with a lesser potential to pollute are regulated. The Local Authority is the regulator.

Regime B – This is the permitting of processes with a lesser potential to pollute. Only emissions to the air are regulated. The Local Authority is the regulator.

15.5.2 Integrated pollution prevention and control

The system of IPPC applies an integrated environmental approach to the regulation of certain industrial activities. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. It also means that regulators must set permit conditions so as to achieve a high level of protection for the environment as a whole. These conditions are based on the use of the 'Best Available Techniques' (BAT) which balances the costs to the operator against the

benefits to the environment (see Box 15.2). IPPC aims to prevent emissions and waste production and, where that is not practicable, reduce them to acceptable levels. PPC also takes the integrated approach beyond the initial task of permitting, through to the restoration of sites when industrial activities cease.

Box 15.2 Best available techniques (BAT)

This term is defined as:

The most effective and advanced stage in the development of activities and their methods of operation which indicates the practicable suitability of particular techniques for providing the basis for emission limit values designed to prevent, and where that is not practicable, generally to reduce the emissions and the impact on the environment as a whole.

This definition implies that BAT not only covers the technology used but also the way in which the installation is operated, to ensure a high level of environmental protection as a whole. BAT takes into account the balance between the costs and environmental benefits (i.e. the greater the environmental damage that can be prevented, the greater the cost for the techniques).

15.5.3 Setting the legal framework

The PPC Regulations implement the EC Directive 96/61/EC on IPPC ('the IPPC Directive'), insofar as it relates to installations in England and Wales. Separate regulations apply the IPPC Directive in Scotland and Northern Ireland and to the offshore oil and gas industries.

Prior to the PPC Regulations coming into force, many industrial sectors covered by the IPPC Directive were regulated under Part I of the EPA 1990. This introduced the systems of IPC, which controlled releases to all environmental media, and LAPC, which controlled releases to air only. Other industrial sectors new to integrated permitting, such as the landfill, intensive farming and food and drink sectors, were regulated, where appropriate, by separate waste management licences issued under Part II of the EPA and/or water discharge consents under the Water Resources Act 1991 or Water Industry Act 1991.

The PPC Regulations create a coherent new framework to prevent and control pollution, with two parallel systems similar to the old regimes of IPC and LAPC. The first of these – the 'Part A' regime of IPPC – applies a similar integrated approach to IPC while delivering the additional requirements of the IPPC Directive. 'Part B' extends the issues that regulators must consider alongside emissions into areas such as energy use and site restoration. The main provisions of IPPC

apply equally to the ex-IPC processes and the other sectors new to integrated permitting. There are also some further requirements that apply solely to waste management activities falling under IPPC.

The IPPC Directive applies to those landfills receiving more than 10 tonnes per day or with a total capacity exceeding 25,000 tonnes (but excluding landfills taking only inert waste), the landfill Directive applies to all landfills. The PPC Regulations have been amended to include all landfills. For landfills the technical requirements are met through the Landfill Regulations. Department of Environment, Food and Rural Affairs (Defra) issued separate guidance on the Landfill Regulations in 2004.

The Environment Agency regulates Part A(1) installations. Part A(2) installations are regulated by the relevant local authority – usually the district, London or metropolitan borough council in England and the county or borough council in Wales. However, the local authority will always be a statutory consultee where the Environment Agency is the regulator, and vice versa. Moreover, the local authority and the Environment Agency will work together in the permitting process. LAs have expertise in setting standards for noise control, while the Environment Agency will ensure that permit conditions protect water adequately. Annex I describes how IPPC installations are classified into either Part A(1) or Part A(2) installations depending on what activities take place within them.

The second new regime – the 'Part B' regime of Local Air Pollution Prevention and Control (LAPPC) – represents a continuation of the old LAPC regime. LAPPC is similar to IPPC from a procedural perspective, but it still focuses on controlling emissions to air only. Defra provides separate guidance on local authority air pollution control.

15.5.4 Overview of the regulatory process

The basic purpose of the IPPC regime is to introduce a more integrated approach to controlling pollution from industrial sources. It aims to achieve 'a high level of protection of the environment taken as a whole by, in particular, preventing or, where that is not practicable, reducing emissions into the air, water and land'. The main way of doing that is by determining and enforcing permit conditions based on BAT.

The entire regulatory process for IPPC consists of a number of elements. These are outlined below. IPPC applies to specified 'installations' – both 'existing' and 'new' – requiring each 'operator' to obtain a permit (from April 2008 an Environmental Permit) from the regulator – either the Environment Agency or the Local Authority.

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15.5.5 Environmental permitting

Introduction

The Environment Agency provides guidance on environmental permitting which aims to provide comprehensive help for those operating, regulating or interested in facilities that are covered by the Environmental Permitting (England and Wales) Regulations 2010 SI 2010 No. 675 (EP Regulations).

These Regulations revoke and replace the Environmental Permitting (England and Wales) Regulations 2007, the system of waste management licensing in Part II of the EPA 1990 (c. 43) and the Waste Management Licensing Regulations 1994 (SI 1994/1056, as amended), and the system of permitting in the Pollution Prevention and Control (England and Wales) Regulations 2000 (SI 2000/1973, as amended), with a new system of environmental permitting in England and Wales. In July 2009 the 2007 Regulations were amended to bring mining waste operations into the permitting regime. The changes resulted in a local authority requiring the Secretary of State or Welsh Ministers' consent to institute summary proceedings for certain statutory nuisances against waste operations that are permitted or are registered as exempt or mining waste operations that are permitted in the same way as they already were for Part A(1), A(2) and Part B installations and mobile plant.

The Environmental Permitting (England and Wales) Regulations 2010 generally revoked and replaced the 2007 Regulations and brought three further regimes into the environmental permitting regime. These included:

- ▶ water discharge activities and exemptions;
- ▶ groundwater activities and exemptions; and
- ▶ radioactive substances activities and exemptions.

What is environmental permitting?

Some activities could harm the environment or human health unless they are controlled. The Environmental Permitting Regime ('the Regime') requires operators to obtain permits for some facilities, the registration of exemptions for other facilities and ongoing supervision by regulators. The Regime was first operated under the EP 2007 Regulations which came into force on 1 April 2008 and now with the 2010 Regulations from 6 April 2010 plus a number of amendment regulations since.

The aim of the Regime is to:

- ▶ protect the environment so that statutory and Government policy environmental targets and outcomes are achieved;
- ▶ deliver permitting and compliance effectively and efficiently in a way that provides increased clarity and minimises the administrative burden on both the regulator and the operators of facilities;
- ▶ encourage regulators to promote best practice in the operation of regulated facilities;

- ▶ continue to fully implement European legislation.

The Regime covers facilities previously regulated by the PPC Regulations and Waste Management Licensing Regulations and exemptions. The Regime extends to England and Wales. It also covers the adjacent sea as far as the seaward boundary of the territorial sea.

The legal framework

The Regulations set out the following:

- ▶ the facilities that need environmental permits or need to be registered as exempt;
- ▶ the process for registering exemptions;
- ▶ how to apply for and determine permit applications;
- ▶ requirements that environmental permits contain conditions to protect the environment as required by Directives and national policy;
- ▶ how environmental permits can be changed and ultimately be surrendered;
- ▶ a simplified permitting system called standard conditions;
- ▶ compliance obligations backed up by enforcement powers and offences;
- ▶ provisions for public participation in the permitting process;
- ▶ the powers and functions of regulators, the Secretary of State and the Welsh Assembly Government (WAG);
- ▶ a simple transition to the new regime;
- ▶ provisions for appeals against permitting decisions.

15.5.6 What facilities require an Environmental Permit?

The EP Regulations specify which activities and waste operations require an Environmental Permit and provide that some waste operations can be exempt from the requirements. Certain waste operations covered by other legislation are excluded from permitting.

Regulated facilities

The nine classes of regulated facility are:

- ▶ an installation (where activities listed in Schedule 1 to the Regulations, and any directly associated activities, are carried on – see Installations);
- ▶ mobile plant (used to carry on either one of the Schedule 1 activities or a waste operation);
- ▶ a waste operation;
- ▶ a mining waste operation;
- ▶ a radioactive substances activity;
- ▶ a water discharge activity;
- ▶ a groundwater activity;
- ▶ a small waste incineration plant;
- ▶ a solvent emission activity.

There may be more than one regulated facility on the same site. In such cases there are arrangements in the EP Regulations to allow all such facilities to be regulated.

by the same regulator and to allow, in many cases, for a single permit.

It is an offence under Regulation 12 to operate a regulated facility without a permit.

An Environmental Permit can, however, cover more than one regulated facility (Regulation 17).

When can a single permit be granted?

A single Environmental Permit can only be granted for more than one regulated facility where:

- ▶ the regulator is the same for each facility;
- ▶ the operator is the same for each facility;
- ▶ all the facilities are on the same site (the exceptions to this are set out as follows).

Where the regulator and operator are the same, a single Environmental Permit can be granted to an operator for more than one mobile plant. Mobile plants do not have to be operating on the same site in order to be included in a single permit.

Where the regulator and operator are the same, a single Environmental Permit can be granted to an operator for more than one regulated facility to which standard rules apply. Standard facilities do not have to be on the same site in order to be included in a single permit. However, standard facilities on different sites cannot be combined in a single permit where the IPPC Directive applies to any of the facilities.

Regulated facilities have to be on the same site in order to be covered by the same permit (with the exceptions of mobile plant and standard facilities set out previously). The regulator should consider the following factors in determining whether the facilities are on the same site.

Proximity – there should, however, be no simple ‘cut off’ distance since some industrial complexes cover very large areas but still can be regarded as one site for permitting purposes.

Coherence of a site – some regulated facilities will be within a single fenced area or may share security or emergency systems.

Management systems – the extent to which the regulated facilities share a common management system is a relevant consideration.

It is expected that a regulator will adopt a common-sense approach to determining when facilities should be regulated under one permit. This consideration should be based on achieving protection of the environment in the most efficient regulatory manner.

15.5.7 Exempt facilities

Some facilities that pose a sufficiently low risk can be exempt from the need to hold a permit. However, this is only where any applicable European Directive allows it. A waste operation, water discharge or groundwater activity must meet certain criteria in order to be exempt

from the need for an Environmental Permit. An exempt facility must:

- ▶ meet the criteria of Schedule 2;
- ▶ be consistent with the need to attain the objectives in Article 24 of the Waste Framework Directive;
- ▶ be registered.

15.5.8 The regulator

The regulator for each category of regulated facility is identified in Regulation 32.

The Environment Agency regulates:

- ▶ Part A(1) installations;
- ▶ waste mobile plant;
- ▶ waste operations including those carried on at a Part B installation or by Part B mobile plant (unless the waste operation is a Part B activity);
- ▶ mining waste operations including any carried on at a Part B installation;
- ▶ radioactive substances activities;
- ▶ water discharge activities including those carried on at a Part B installation;
- ▶ groundwater activities including those carried on at a Part B installation.

The relevant local authority regulates:

- ▶ Part A(2) installations including any waste operations, water discharge activities or groundwater activities carried on as part of the installation or mobile plant;
- ▶ the ‘Part B’ installations and Part B mobile plant (except as set out above);
- ▶ small waste incineration plants;
- ▶ solvent emission activities.

LAPPC focuses on controlling emissions to air only for Part B installations. Defra and WAG jointly provide guidance on local authority air pollution and control.

15.5.9 Environmental Permit applications

The operator

Only a person who is in control of the facility may obtain or hold an Environmental Permit. This person is the ‘operator’ (Regulation 7).

The meaning of ‘operator’ is set out in Box 15.3. In most cases a single operator will have to obtain a single Environmental Permit for each regulated facility.

However, in some circumstances different operators run different parts of a regulated facility. This does not affect the regulator’s determination of what actually constitutes the regulated facility.

Box 15.3 ‘Operator’

‘Operator’ is defined in Regulation 7 as the person who has control over the operation of a regulated facility.

If a regulated facility has not been put into operation, the person who will have control over it when it is in operation is the operator.

If a regulated facility authorised by an Environmental Permit has ceased to be in operation, the person who holds the permit is the operator.

Legal obligations may be imposed on an operator during the pre- and post-operational phases.

The operator must demonstrably have the authority and ability to ensure the Environmental Permit is complied with.

Where two or more operators run different parts of a single regulated facility, they will each need a separate Environmental Permit and be responsible for complying with their permit conditions. In such cases, there should be no ambiguity over which operator has responsibility for which part of the regulated facility.

The requirement that the permit holder must be the operator of the facility is different from the previous system under waste management licensing. The transitional provisions therefore allow the holder of a waste management licence to be treated as the operator for the purposes of the Regulations (see Regulation 69(2)). However, when permits are transferred over time they must be transferred to the person who will have control of the regulated facility.

Pre-application discussions

Pre-application discussions between operators and regulators can help in improving the quality of the formal application and are therefore encouraged. In order for such discussions to make the best use of time, the operator is expected to have read the relevant published guidance. The regulator should not be expected to provide advice that might prejudice its determination of an application.

Operators and regulators may use the discussions to clarify whether a permit is likely to be needed. The regulator may also give operators general advice on how to prepare their applications, focus on the key issues and tell them what additional guidance is available.

Operators should bear in mind that, especially for controversial cases, good engagement with local or national interested parties at the pre-application stage can be beneficial to all sides.

Using existing data

Operators may, where relevant, draw upon or attach other sources of information in their applications. These might include:

- ▶ environmental impact assessments;
- ▶ documents relating to an installation's regulation under the Control of Major Accident Hazards (COMAH) Regulations;
- ▶ prior investigations for compliance with the Groundwater Regulations;
- ▶ externally certified environmental management systems (EMSs);
- ▶ site reports prepared for planning purposes.

They should make clear which parts of any attachments are relevant to their Environmental Permit application and should demonstrate how they relate to the Directive requirements.

Timing of applications

Operators should normally make an application when they have drawn up full designs but before construction work commences (whether on a new regulated facility or when making changes to an existing one). Where facilities are not particularly complex or novel, the operator should usually be able to submit an application at the design stage containing all information the regulator needs. If, in the course of construction or commissioning, the operator wants to make any changes which mean that the permit conditions need to be varied, the operator may apply for this in the normal way.

There is nothing in the regulations to stop an operator from beginning construction before a permit has been issued. However, regulators may not agree with the design and infrastructure put in place. Therefore, to avoid any expensive delays and re-work, it is in the operator's interest to submit applications at the design stages. Any investment or construction work that an operator carries out before they have got their Environmental Permit will be at their own risk and no way affect the regulator's decision.

Planning and Environmental Permit applications

If a regulated facility also needs planning permission, it is recommended that the operator should make both applications in parallel whenever possible. This will allow the pollution control regulator to start its formal consideration early on, thus allowing it to have a more informed input to the planning process. For certain waste operations and certain mining waste facilities where planning permission is required, this must be in force before an Environmental Permit can be granted.

15.5.10 Transitional arrangements

Existing permissions

The EP Regulations provide transitional arrangements for existing permits, licences, authorisations, registrations and consents (existing permissions)

so new applications for environmental permits are not required.

The regulator for these permits remains the same and will not change unless there is a subsequent direction from the Secretary of State or the Welsh Ministers.

Except where there is an outstanding application (see below) these existing permissions automatically become environmental permits from the date the Regulations come into force.

Existing permissions with an outstanding application to transfer, surrender, vary or modify

Existing permissions do not become environmental permits on the date the EP Regulations come into force where there is an outstanding, duly-made, application in relation to the existing permission. The relevant applications are those to transfer, surrender, vary or modify the existing permissions.

15.5.11 Application procedures

Applications

The requirements for applications are set out in Schedule 5 to the Regulations. The application must:

- ▶ be made by the operator (though it may be made by an agent acting on behalf of the operator);
- ▶ in the case of a transfer application, be made jointly by the current operator and the future operators;
- ▶ be made on the form provided by the regulator;
- ▶ include the information required by the application form;
- ▶ include the relevant fee.

An applicant can withdraw an application at any time before it is determined but the regulator is not obliged to return any of the application fee.

15.5.12 Permit conditions

If the regulator grants a permit it can include any conditions it sees fit. It has a duty to impose conditions in order to secure the objectives that apply to the category of facility.

Where the regulator grants an application for the variation, transfer or partial surrender of an Environmental Permit and there are additional variations needed as a consequence of the application, the regulator should make those necessary variations to the Environmental Permit.

All permit conditions should be both necessary and enforceable. 'Necessary' means that the regulator should be able to justify – at appeal if necessary – the permit conditions it attaches. To be enforceable, conditions should clearly state the objective, standard or desired outcome of the condition so that the operator can understand what is required.

Permit conditions may comprise some or all of the following:

- ▶ conditions stipulating objectives or outcomes;
- ▶ standards to mitigate a particular hazard/risk;
- ▶ conditions addressing particular legislative requirements.

The regulator can include conditions in the permit setting out steps to be taken during, prior to and after the operation of the regulated facility.

15.5.13 Standard permits

Standard rules

The Secretary of State, Welsh Minister and the Environment Agency can make standard rules (Regulation 26).

These rules consist of requirements common to the class of facilities subject to them (standard facilities – Regulation 2) and can be used instead of site-specific permit conditions. Standard rules would be suitable for industry sectors where a number of regulated facilities share similar characteristics in relation to environmental hazards.

The standard rules must achieve the same high level of environmental protection as site-specific conditions.

The rules are the conditions of the standard permit for all purposes other than for appeals. The standard rules cannot be appealed (Regulation 27(3)) as applying for a permit subject to the rules is voluntary.

Developing standard rules

In preparing standard rules, it is necessary to consult widely with those who may be affected by or have an interest in the rules (Regulation 26(2)), including relevant statutory bodies. The standard nature of the facilities for which standard rules will be produced allows a general consideration of the requirements and standards for all such facilities.

It is expected that standard rules will be developed in consultation with the relevant industry.

Assessments of risk can be carried out nationally for common generic activities. This understanding of the hazards and risks posed by these activities would form the basis for the development of standard rules for standard facilities.

15.5.14 Standard rules

It is the operator's decision as to whether they wish to operate under standard rules. Where standard rules have been made, operators of standard facilities can, if they so wish, request that their facility be subject to the relevant rules. This request may be made in an application for a new permit or an application to vary an Environmental Permit.

Operators may apply to operate under a set of standard rules.

The generic assessments of risk for standard facilities should be made available to applicants to assist them in determining whether their activity is within the scope of the standard rules and, if they apply for a standard permit, in the adoption of suitable control measures to meet those rules.

One important difference from other regulated facilities is that any additional site-specific assessment of risk is not necessary for a standard facility. Regulated facilities that require a location-specific assessment of impact and risk are not suitable for standard rules.

Public consultation on applications for individual standard facilities is not required (other than for Part A installations).

15.5.15 Operator competence and management systems

Following an application for the grant or transfer of an Environmental Permit, there is also a specific duty on the regulator not to grant or transfer the permit if it considers that the operator will not operate the facility in accordance with the permit. In making this decision the regulator should consider whether the operator cannot or is unlikely to operate the facility in accordance with the permit. The regulator might doubt whether the operator could or is likely to comply with the permit conditions if, for example:

- ▶ the operator's management system is inadequate;
- ▶ the operator's technical competence is inadequate;
- ▶ the operator has a poor record of compliance with previous regulatory requirements, or
- ▶ the operator's financial competence is inadequate.

In order to ensure a high level of environmental protection, operators should have effective management systems in place. The nature of the required management system depends upon the complexity of the regulated facility.

Complex regulated facilities are encouraged to put in place a formal EMS externally certified to the international standard ISO 14001 by the UKAS accredited certification body or other European equivalent and to register for the EU's Eco Management and Audit Scheme (EMAS). These standards require that the management system include safeguards for legal compliance and a commitment to continuous improvement of environmental performance. Additionally EMAS requires organisations to produce an independently validated public report about their environmental performance and progress against targets and objectives. Where relevant the performance should be benchmarked against European legislation, e.g. BAT under IPPC. EMAS and ISO 14001 are also recognised by the Environment Agency's risk rating scheme OPRA (Operator and Pollution Risk Appraisal scheme). OPRA

scores are linked to fees and charges. Organisations which have implemented an EMS may achieve a higher OPRA score and can pay lower fees and charges.

For simpler regulated facilities, externally certified schemes or a full EMS may be less appropriate. Such schemes should still be carefully considered by operators where appropriate, encouraged by regulators. A stepwise approach provided by BS8555 is particularly appropriate for smaller facilities and can make EMS implementation much simpler. Organisations can also achieve UKAS accredited certification to one or more stages of BS8555 under the IEMA Acorn or BS8555 Sterns schemes. The European Commission has also developed a simplified implementation guide for EMAS 'easy', which aims to help small and medium enterprises (SMEs) achieve registration for EMAS. There is also specific guidance on management systems for some industry sectors on the website of the Institute of Environmental Management and Assessment.

EMSs have relevance to other aspects of regulation such as determining risk-based inspection frequencies. Recognised quality assurance schemes may also be relevant, and regulators may also take account of certified systems where these can be demonstrated to provide an equivalent role in safeguarding compliance and continual improvement of environmental performance.

Operators should be technically competent to operate their facility. The operator's wider management system should contain mechanisms for assessing and maintaining technical competence. The competence of individuals should form part of those management systems.

The development of industry led competence schemes is strongly encouraged by the Environment Agency.

15.5.16 Enforcement Enforcement notices

Regulation 36 of the EP Regulations allows the regulator to serve an 'enforcement notice' if it believes an operator has contravened, is contravening or is likely to contravene any permit conditions.

Enforcement notices will specify the steps required to remedy the problem and the timescale in which they must be taken. Enforcement notices may include steps to remedy the effects of any harm and to bring the regulated facility back into compliance.

Suspension notices

If the operation of a regulated facility involves a risk of serious pollution, the regulator may serve a 'suspension notice' under Regulation 37 of the Regulations. This applies whether or not the operator has breached a permit condition.

The suspension notice must describe the nature of the risk of pollution and the actions necessary to remove that risk. The notice must specify the deadline for taking actions.

When the regulator serves a suspension notice, the permit ceases to authorise the operation of the entire facility or specified activities depending upon what is specified in the notice.

A suspension notice should allow activities to continue unless their cessation is necessary to address the risk of pollution. While the suspension notice is in force, additional restrictions may be necessary for any activities that are allowed to continue. Where this is the case the suspension notice must set out these additional steps.

When the operator has taken the remedial steps required by the notice, the regulator must withdraw the notice.

Prosecutions

If an operator has committed a criminal offence under the Regulations, regulators should consider a prosecution. Conviction in a Magistrates' Court carries a fine of up to £50,000 and up to 12 months imprisonment for the most serious offences under the Regulations. Conviction in the Crown Court for those offences may lead to an unlimited fine and imprisonment for up to five years.

15.5.17 Wider scope of IPPC

IPPC takes a wider range of environmental impacts into account than IPC, which regulated emissions to land, water and air. The IPPC regime additionally takes into account: waste avoidance or minimisation, energy efficiency, accident avoidance, and minimisation of noise, heat and vibrations. These aims will achieve a higher level of protection as a whole.

IPPC also applies to a wider range of industries than IPC. These industries include all installations that are currently regulated under IPC, some installations currently under LAPC and some installations that are not currently under either regime, such as landfill sites, intensive agriculture, large pig and poultry units, and food and drink manufacturers.

Under IPPC, regulated industries are referred to as 'installations' as opposed to 'processes', which is the term used for IPC. This change in terminology enables a more integrated approach to regulation; a whole installation must be permitted rather than just individual processes within the installation.

Guidelines to establish which techniques are BAT are published by the European Commission's IPPC Bureau. These reference notes are known as BREF notes and provide the basis for national sectoral guidance. The Environment Agency has supplementary guidance

to cover many issues, some, for example energy efficiency, site remediation and noise, are new issues under IPPC. Industry sectors not previously regulated under the EPA 1990 such as intensive farming and food and drink installations are also covered by guidance.

15.5.18 Duty of care

Waste and the duty of care

The duty of care is covered in Part II of the EPA 1990. The duty of care applies to anyone who produces or imports, keeps or stores, transports, treats or disposes of waste. It also applies if they act as a broker and arrange these things.

The duty-holder is required to take all reasonable steps to keep waste safe. If they give waste to someone else, the duty-holder must be sure they are authorised to take it and can transport, recycle or dispose of it safely.

The penalty for breach of this law is an unlimited fine.

Waste can be anything owned, or that a business produces, which a duty-holder wants to get rid of. Controlled waste is defined in Box 15.4.

Box 15.4 Definition of controlled waste

Controlled waste means household, commercial or industrial waste. It includes any waste from a house, school, university, hospital, residential or nursing home, shop, office, factory or any other trade or business premises. It is controlled waste whether it is solid or liquid and even if it is not hazardous or toxic.

If the waste comes from a person's own home, the duty of care **does not** apply to them. But if the waste is not from the house they live in – for example, if it is waste from their workplace or waste from someone else's house – the duty of care does apply.

Animal waste collected and transported under the Animal By-Products Order 1992 is not subject to the duty of care.

Duty-holders must take all reasonable steps to fulfil the duty and complete some paperwork. What is reasonable depends on what is done with the waste.

Steps to take if the duty of care applies: when a duty-holder has waste, they must:

- ▶ stop it escaping from their control and store it safely and securely. They must prevent it causing pollution or harming anyone;
- ▶ keep it in a suitable container. Loose waste in a skip or on a lorry must be covered;
- ▶ if the duty-holder gives waste to someone else, check that they have authority to take it. The law says the person to whom they give the waste must be authorised to take it. Box 15.5 shows who is

allowed to take waste and how the duty-holder can check;

- ▶ describe the waste in writing. The duty-holder must fill in and sign a transfer note for it and keep a copy. To save on paperwork, the description of the waste can be written on the transfer note (see Box 15.6).

When a person takes waste from someone else they must:

- ▶ be sure the law allows them to take it. Box 15.5 shows who is allowed to take waste;
- ▶ make sure the person giving them the waste describes it in writing. The waste receiver must fill in and sign a transfer note and keep a copy (see Box 15.6).

Box 15.5 Who has authority to take waste?

Council waste collectors

The duty-holder does not have to do any checking, but if they are not a householder, there is some paperwork to complete. This is explained in Box 15.6.

Registered waste carriers

Most carriers of waste have to be registered with the Environment Agency or the Scottish Environment Protection Agency. Look at the carrier's certificate of registration or check with the Agencies.

Exempt waste carriers

The main people who are exempt are charities and voluntary organisations. Most exempt carriers need to register their exemption with the Environment Agency or the Scottish Environment Protection Agency. If someone says they are exempt, ask them why. Check with the Agencies that their exemption is registered.

Holders of environmental permits (from April 2008 – formerly Licences)

Some environmental permits are valid only for certain kinds of waste or certain activities. Ask to see the permit. Check that it covers the kind of waste being consigned.

Businesses exempt from environmental permits

There are exemptions from permitting for certain activities and kinds of waste. Most exempt businesses need to register their exemption with the Environment Agency or the Scottish Environment Protection Agency. Check with the Agencies that their exemption is registered.

Authorised transport purposes

Waste can also be transferred to someone for 'Authorised transport purposes'. This means:

the transfer of controlled waste between different places within the same premises; the transport of controlled waste into Great Britain from outside Great Britain; the transport by air or sea of controlled waste from a place in Great Britain to a place outside Great Britain.

Registered waste brokers

Anyone who arranges the recycling or disposal of waste, on behalf of someone else, must be registered as a waste broker. Check with the Environment Agency or the Scottish Environment Protection Agency that the broker is registered.

Exempt waste brokers

Most exempt waste brokers need to register with the Environment Agency or the Scottish Environment Protection Agency. Those who are exempt are mainly charities and voluntary organisations. If someone tells you they are exempt, ask them why. You check with the Environment Agencies that their exemption is registered.

Box 15.6 Filling in paperwork

When waste is passed from one person to another the person taking the waste must have a written description of it. A transfer note must be filled in and signed by both persons involved in the transfer.

The duty-holder can write the description of the waste on the transfer note. Who provides the transfer note is not important as long as it contains the right information. The Government has published a model transfer note with the Code of Practice which can be used if desired. Repeated transfers of the same kind of waste between the same parties can be covered by one transfer note for up to a year, for example waste collections from shops.

The transfer note to be completed and signed by both persons involved in the transfer must include:

- ▶ what the waste is and how much there is
- ▶ what sort of containers it is in
- ▶ the time and date the waste was transferred
- ▶ where the transfer took place
- ▶ the names and addresses of both persons involved in the transfer
- ▶ whether the person transferring the waste is the importer or the producer of the waste
- ▶ the details of which category of authorised person each one is. If the waste is passed

to someone for authorised transport purposes, you must say which of those purposes applies

- ▶ if either or both persons is a registered waste carrier, the certificate number and the name of the Environment Agency which issued it
- ▶ if either or both persons have an Environmental Permit (or an old waste management licence), the permit number (or old licence number) and the name of the Environment Agency which issued it
- ▶ the reasons for any exemption from the requirement to register or have an Environmental Permit
- ▶ where appropriate, the name and address of any broker involved in the transfer of waste.

The written description – The written description must provide as much information as someone else might need to handle the waste safely.

Keeping the papers – Both persons involved in the transfer must keep copies of the transfer note and the description of the waste for 2 years. They may have to prove in court where the waste came from and what they did with it. A copy of the transfer note must also be made available to the Environment Agency or the Scottish Environment Protection Agency if they ask to see it.

15.5.21 Introduction to the waste hierarchy

Article 4 of the revised *EU Waste Framework Directive* sets out 5 steps for dealing with waste, ranked according to environmental impact – the ‘waste hierarchy’ see Table 15.2.

Prevention, which offers the best outcomes for the environment, is at the top of the priority order, followed by preparing for reuse, recycling, other recovery and disposal, in descending order of environmental preference.

Table 15.2 Waste hierarchy

Stages	Include
Prevention:	using less material in design and manufacture, keeping products for longer, reuse, using less hazardous materials
Preparing for reuse:	checking, cleaning, repairing, refurbishing, whole items or spare parts
Recycling:	turning waste into a new substance or product, includes composting if it meets quality protocols
Other recovery:	includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste, some backfilling
Disposal:	landfill and incineration without energy recovery

The waste hierarchy has been transposed into UK law through the *The Waste (England and Wales) Regulations 2011*. The regulations came into force on 29 March 2011. The provisions relating to the hierarchy (set out in Regulations 12 and 15) came into force on 26 September 2011.

If a business or organisation (including local authorities on behalf of householders) produces or handles waste (this includes importing, producing, carrying, keeping or treating waste; dealers or brokers who have control of waste, and anyone responsible for the transfer of waste), they must take all such measures as are reasonable in the circumstances to:

- ▶ prevent waste
- ▶ apply the waste hierarchy when transferring waste.

15.5.22 Further information

See Environmental Permitting Guidance Core Guidance revised March 2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211852/pb13897-ep-core-guidance-130220.pdf

Also see new guidance *How to comply with your environmental permit* June 2013 <http://publications.environment-agency.gov.uk>

Guidance on applying the waste hierarchy <https://www.gov.uk/government/uploads/system/uploads/>

15.5.19 Hazardous waste

On 16 July 2005, the Hazardous Waste (England and Wales) Regulations and the List of Wastes (England) Regulations, replacing the Special Waste Regulations, came into force (Scotland has retained The Special Waste Regulations). The Regulations can be found on the Government website at: <http://www.legislation.gov.uk/ukSI/2005/894/>

The regime includes a requirement for most producers of hazardous waste to notify their premises to the Environment Agency. The facility to notify premises has been available since April 2005. Guidance on notification, including the online notification facility, and more general guidance on the regime, can be found on the Environment Agency’s hazardous waste pages. See a brief summary of these Regulations in Section 15.19.

15.5.20 Applying for a waste management licence

From April 2008 this has now been replaced by the Environmental Permitting regime. See Section 15.5.5.

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attachment_data/file/69403/pb13530-waste-hierarchy-guidance.pdf

Small businesses a guide to the Hazardous Waste Regulations, Environment Agency July 2013, HWR01A, <http://www.environment-agency.gov.uk/business/topics/waste/32180.aspx>

Other sources of information on environmental management systems

- ▶ EMAS: www.ema.net/ems/emas and <http://europa.eu.int/comm/environment/emas>
- ▶ EMAS Easy: <http://ec.europa.eu/environment/emas/toolkit/>
- ▶ ISO 14001: <http://www.bsigroup.com/en/>
- ▶ UKAS: www.ukas.com
- ▶ Acorn: www.ema.net/acorn
- ▶ BSI Stems: www.bsi-global.com/en/Assessment-and-certification-services/management-systems/Standards-and-Schemes/BS-8555-STEMS/
- ▶ Green Dragon: www.greendragonems.com/

15.6 Control of Artificial Optical Radiation at Work Regulations 2010

15.6.1 Introduction

These Regulations implement as respects Great Britain Directive 2006/25/EC of the European Parliament and of the Council (O.J. L114, 27.4.2006, p.38) on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents AOR (artificial optical radiation). The Regulations impose duties on employers to protect both employees who may be exposed to risk from exposure to artificial optical radiation at work and other persons at work who might be affected by that work. AOR includes light emitted from all artificial sources in all its forms such as ultraviolet, infrared and laser beams, but excludes sunlight.

Regulation 1(2) defines exposure limit values as being those set out in Annexes I and II to the Directive, as amended from time to time, and these Annexes provide for exposure limit values for non-coherent radiation and laser radiation respectively.

15.6.2 Duties

The Regulations impose a duty to carry out a specific form of risk assessment where an employer carries out work which could expose its employees to levels of artificial optical radiation (i.e. artificial light) that could create a reasonably foreseeable risk of adverse health effects to the eyes or skin and where those risks have not already been eliminated or controlled (Regulation 3).

Where a risk assessment is necessary the Regulations also impose duties to –

- (a) eliminate, or where this is not reasonably practicable, to reduce to as low a level as is reasonably practicable the risk of adverse health effects to the eyes or skin of the employee as a result of exposure to artificial optical radiation where this risk has been identified in the risk assessment (Regulation 4(1));
- (b) devise an action plan comprising technical and organisational measures to prevent exposure to artificial optical radiation exceeding the exposure limit values where the risk assessment indicates that employees are exposed to levels of artificial optical radiation that exceed the exposure limit values (Regulation 4(3));
- (c) take action in the event that the exposure limit values are exceeded despite the implementation of the action plan and measures to eliminate or reduce so far as is reasonably practicable the risk of exposure (Regulation 4(5));
- (d) demarcate, limit access to, and provide for appropriate signs in those areas where levels of artificial optical radiation are indicated in the risk assessment as exceeding the exposure limit values (Regulation 4 (6) and (7));
- (e) provide information and training if the risk assessment indicates that employees could be exposed to artificial optical radiation which could cause adverse health effects to the eyes or skin of the employee (Regulation 5); and
- (f) to provide health surveillance and medical examinations in certain cases (Regulation 6).

15.6.3 Safe light sources

The following information is taken from the HSE Guidance for Employers available at: www.hse.gov.uk/radiation/nonionising/employers-aor.pdf

The majority of light sources are safe, such as those described in List 1 below. If these sources, or similar are being used workers are not at risk and there is no need to do anything further.

However, when making this decision, employers should consider the following points to ensure that all workers are protected:

- ▶ If there are any workers whose health is at particular risk (e.g. those with pre-existing medical conditions made worse by light).
- ▶ If workers use any chemicals (e.g. skin creams), which could react with light to make any health effects worse.
- ▶ If any workers are exposed to multiple sources of light at the same time.
- ▶ If exposure to bright light could present unrelated risks (e.g. temporary blindness could lead to mistakes being made in hazardous tasks).

List 1 Safe light sources

- ▶ All forms of ceiling-mounted lighting used in offices, etc. that have diffusers over bulbs or lamps.
- ▶ All forms of task lighting including desk lamps and tungsten-halogen lamps fitted with appropriate glass filters to remove unwanted ultraviolet light.
- ▶ Photocopiers.
- ▶ Computer or similar display equipment, including personal digital assistants (PDAs).
- ▶ Light emitting diode (LED) remote control devices.
- ▶ Photographic flashlamps – when used singly.
- ▶ Gas-fired overhead heaters.
- ▶ Vehicle indicator, brake, reversing and fog lamps.
- ▶ Any exempt or Risk Group 1 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008.
- ▶ Any Class 1 laser light product, as defined in British Standard BS EN 60825-1: 2007, for example laser printers and bar code scanners.

There are also some sources of light that, if used inappropriately, e.g. placed extremely close to the eyes or skin, have the potential to cause harm but which are perfectly safe under normal conditions of use. Examples include:

- ▶ Ceiling-mounted fluorescent lighting without diffusers over bulbs or lamps.
- ▶ High-pressure mercury floodlighting.
- ▶ Desktop projectors.
- ▶ Vehicle headlights.
- ▶ Non-laser medical applications such as:
 - ▶ operating theatre and task lighting;
 - ▶ diagnostic lighting such as foetal/neonatal transilluminators and X-ray light/viewing boxes.
- ▶ UV insect traps.
- ▶ Art and entertainment applications such as illumination by spotlights, effect lights and flashlamps (provided that any ultraviolet emissions have been filtered out).
- ▶ Multiple photographic flashlamps, for example in a studio.
- ▶ Any Risk Group 2 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008.
- ▶ Class 1M, 2 or 2M lasers, as defined in British Standard BS EN 60825-1: 2007, for example low-power laser pointers.

The above list is not exhaustive.

15.6.4 Hazardous light sources

Some sources of light can cause a risk of ill-health, such as: burns or reddening (erythema) of the skin or surface of the eye (photokeratitis); burns to the retina of the eye; so-called blue-light damage to the eye (photoretinitis) and damage to the lens of the eye that may bring about the early onset of cataract.

List 2 Hazardous light sources

Examples of hazardous sources of light that present a 'reasonably foreseeable' risk of harming the eyes and skin of workers and where control measures are needed include:

- ▶ Metal working – welding (both arc and oxy-fuel) and plasma cutting.
- ▶ Pharmaceutical and research – UV fluorescence and sterilisation systems.
- ▶ Hot industries – furnaces.
- ▶ Printing – UV curing of inks.
- ▶ Motor vehicle repairs – UV curing of paints and welding.
- ▶ Medical and cosmetic treatments – laser surgery, blue light and UV therapies, Intense Pulsed Light sources (IPLs).
- ▶ Industry, research and education, for example, all use of Class 3B and Class 4 lasers, as defined in British Standard BS EN 60825-1: 2007.
- ▶ Any Risk Group 3 lamp or lamp system (including LEDs), as defined in British Standard BS EN 62471: 2008, for example search lights, professional projections systems.

Less common hazardous sources are associated with specialist activities – for example lasers exposed during the manufacture or repair of equipment, which would otherwise not be accessible.

15.6.5 Further information

Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations (AOR) 2010
<http://www.hse.gov.uk/radiation/nonionising/employers-aor.pdf>

The full text of the Regulations is available from the UK Government Information website at <http://www.legislation.gov.uk/uksi/2010/1140/contents/made>

15.7 Classification, Labelling and Packaging of Substances and Mixtures Regulation (European) adopting into EU UN Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

15.7.1 Introduction

Worldwide, there are many different laws on how to identify hazardous chemicals (classification) and how this information should be communicated to users (via labels and safety data sheets – SDSs).

This is often confusing as the same chemical can have different hazard descriptions in different countries. The UN brought together experts from different countries to create the GHS.

The aim of GHS is to have, throughout the world, the same:

- ▶ criteria for classifying chemicals according to their health, environmental and physical hazards;
- ▶ hazard communication requirements for labelling and SDSs.

The GHS is not a law, it's an international agreement. To make the GHS legally apply, each country or bloc of countries must adopt the GHS through legislation. European Union (EU) member states agreed to adopt the GHS across the EU through a direct-acting Regulation, the European Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of substances and mixtures. This is also known as the 'CLP Regulation' or just 'CLP'.

15.7.2 The Classification, Labelling and Packaging (CLP) of substances and mixtures regulation

The CLP Regulation:

- ▶ is a direct-acting regulation in all EU member states, including the UK, and does not require transposing into national legislation;
- ▶ adopts the majority of the GHS 'hazard classes' (nature of the hazard) and 'hazard categories' (severity of the hazard);
- ▶ keeps a few aspects of the existing EU system, where these do not contradict the GHS, to maintain existing EU standards (e.g. harmful to the ozone layer);
- ▶ replaces the requirements of the Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations Directive (1999/45/EC) relating to the classification, packaging and labelling of substances and preparations, over a transitional period lasting until 1 June 2015;
- ▶ introduces newly designed hazard symbols, known as pictograms (see Figure 15.1);
- ▶ introduces new labelling phrases, known as 'hazard statements' and 'precautionary statements';
- ▶ introduces new provisions for a classification and labelling inventory;
- ▶ maintains the list of harmonised classifications.

The CLP Regulation became law throughout the EU on 20 January 2009 but it did not apply all at once, to give suppliers and their customers time to adapt to the new system until June 2015.

15.7.3 Requirements of the CLP Regulation

The CLP Regulation requires:

- ▶ substances to be classified, labelled and packaged according to the CLP Regulation from 1 December 2010 onwards;

- ▶ mixtures to be classified, labelled and packaged according to the CLP Regulation from 1 June 2015 onwards.

The former system required that suppliers must use certain symbols and warning phrases on the label to inform users about the hazards of chemicals.

The CLP Regulation introduces new hazard pictograms (symbols), and new 'signal' words such as 'warning' and 'danger', together with new phrases for the different hazards.

Although many of the CLP pictograms are similar to the existing EU system, they have been re-designed. The new pictograms are diamond shaped, white and black with a red border.

15.7.4 Chemical manufacture and storage – the European Commission's chemical strategy (REACH)

What is REACH?

REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) is the system for controlling chemicals in the EU. It became law in the UK on 1 June 2007. In October 2006, Defra nominated HSE to be the Competent Authority for REACH, working closely with the Environment Agency and other partners to manage other key aspects of the REACH system in the UK.

The Competent Authority's responsibilities under REACH are to:

- ▶ provide advice to manufacturers, importers, downstream users and other interested parties on their respective responsibilities and obligations under REACH (Competent Authorities' helpdesk);
- ▶ conduct substance evaluation of prioritised substances and prepare draft decisions;
- ▶ propose harmonised Classification and Labelling for carcinogens, mutagens or reproductive toxicants (CMRs) and respiratory sensitisers;
- ▶ identify substances of very high concern for authorisation;
- ▶ propose restrictions;
- ▶ nominate candidates to membership of ECA committees on Risk Assessment and Socio-economic Analysis;
- ▶ appoint members for the Member State Committee to resolve differences of opinion on evaluation decisions;
- ▶ appoint a member to the Forum for Information Exchange and meet to discuss enforcement matters;
- ▶ provide adequate scientific and technical resources to the members of the Committees that they have nominated;
- ▶ work closely with the European Chemical Agency in Helsinki.











	Example of hazard statement	Example of precautionary statement
	Heating may cause an explosion	Keep away from heat/sparks/open flames/hot surfaces – no smoking
	Heating may cause a fire	Keep only in original container
	May intensify fire; oxidizer	Take any precaution to avoid mixing with combustibles
	Causes serious eye damage	Wear eye protection
	Toxic if swallowed	Do not eat, drink or smoke when using this product
	Toxic to the aquatic life, with long lasting effects	Avoid release to the environment
	New pictogram , reflects serious longer term health hazards such as carcinogenicity and respiratory sensitization, e.g. may cause allergy or asthma symptoms or breathing difficulties if inhaled	In case of inadequate ventilation, wear respiratory protection
	New pictogram , refers to less serious health hazards such as skin irritancy/sensitization and replaces the CHIP  symbol, e.g. may cause an allergic skin reaction	Contaminated work clothing should not be allowed out of the workplace
	New pictogram , used when the containers hold gas under pressure, e.g. may explode when heated	None

Figure 15.1 New GHS pictograms with examples of Hazard statements and Precautionary statements

Aims

REACH has several aims:

- ▶ to provide a high level of protection of human health and the environment from the use of chemicals;
- ▶ to allow the free movement of substances on the EU market;
- ▶ to make the people who place chemicals on the market (manufacturers and importers) responsible for understanding and managing the risks associated with their use;
- ▶ to promote the use of alternative methods for the assessment of the hazardous properties of substances;
- ▶ to enhance innovation in and the competitiveness of the EU chemicals industry.

No data, no market

A major part of REACH is the requirement for manufacturers or importers of substances to register them with a central European Chemicals Agency (ECHA). A registration package will be supported by a standard set of data on that substance. The amount of data required is proportionate to the amount of substance manufactured or supplied.

If substances are not registered, then the data on them will not be available and, as a result, the company will no longer be able to manufacture or supply them legally, that is no data, no market.

Scope and exemptions

REACH applies to substances manufactured or imported into the EU in quantities of 1 tonne per year

or more. Generally, it applies to all individual chemical substances on their own, in preparations or in articles (if the substance is intended to be released during normal and reasonably foreseeable conditions of use from an article). Some substances, e.g. radioactive substances, are specifically excluded. See REACH for details.

Registration

Registration is a requirement on industry (manufacturers/suppliers/importers) to collect and collate specified sets of information on the properties of those substances of which they manufacture or supply. This information is used to perform an assessment of the hazards and risks that substance may pose and how those risks can be controlled. This information and its assessment are submitted to the ECHA in Helsinki.

Chemicals already existing (those on EINECS (European Inventory of Existing Commercial Chemical Substances) or manufactured in the EU prior to entry into force of REACH) are known as 'phase-in' substances under REACH. These will be registered in three phases according to their tonnage and/or hazardous properties.

Non-phase-in substances (i.e. those not on EINECS, or those which have never been manufactured previously or not pre-registered) were subject to registration by 1 June 2008.

Evaluation

Registration packages (dossiers) submitted under REACH can be evaluated for:

- ▶ **Compliance check:** A quality/accuracy check of the information submitted by industry.
- ▶ **Dossier evaluation:** A check that an appropriate testing plan has been proposed for substances registered at the higher tonnage levels (\$100 tonnes/annum).
- ▶ **Substance evaluation:** An evaluation of all the available data on a substance, from all registration dossiers. This is done by national Competent Authorities on substances that have been prioritised for potential regulatory action because of concerns about their properties or uses.

Substances of very high concern

Some substances have hazards that have serious consequences; for example they cause cancer, or they have other harmful properties and remain in the environment for a long time and gradually build up in animals. These are 'substances of high concern'. One of the aims of REACH is to control the use of such substances.

Authorisation

Authorisation is a feature of REACH that is new to the area of general chemicals management. As REACH

progresses, a list of 'substances of very high concern' will be created. Substances on this list cannot be supplied or used unless an authorisation has been granted. A company wishing to market or use such a substance must apply to the ECHA in Helsinki for an authorisation, which may be granted or refused.

Restrictions

Any substance that poses a particular threat can be restricted. Restrictions take many forms, for example from a total ban to not being allowed to supply it to the general public. Restrictions can be applied to any substance, including those that do not require registration. This part of REACH takes over the provisions of the Marketing & Use Directive.

Classification and labelling

An important part of chemical safety is clear information about any hazardous properties a chemical has. The classification of different chemicals according to their characteristics (e.g. those that are corrosive, or toxic to fish) follows an established system, which is reflected in REACH. REACH has been written with GHS in mind (see Section 15.7.1 for more information on GHS).

Information in the supply chain

The passage of information up and down the supply chain is a key feature of REACH. Users should be able to understand what manufacturers and importers know about the dangers involved in using chemicals and how to control risks. However, in order for suppliers to be able to assess these risks they need information from the downstream users about how the chemicals are used. REACH provides a framework in which information can be passed both up and down supply chains.

More detailed information about REACH can be found on the HSE REACH website.

Enforcement

Enforcing this very wide-ranging system presents new challenges to regulators across Europe. REACH places new duties on a range of different businesses. Mostly, the new duties will be on manufacturers and importers of chemicals, but there are also requirements for downstream users of chemicals to share information with their suppliers. The HSE play a key role in enforcing REACH, both as the UK Competent Authority and more generally as the UK occupational health and safety regulator.

15.7.5 Further information

European Chemicals Agency information website for general and specific guidance, <http://echa.europa.eu/web/guest/support/>

guidance-on-reach-and-clp-implementation/
guidance-in-a-nutshell

Guidance in a nutshell – Compilation of safety data sheets, European Chemicals Agency 2013, http://echa.europa.eu/documents/10162/13643/sds_nutshell_guidance_en.pdf

HSE Chemical Classification website: <http://www.hse.gov.uk/chemical-classification/index.htm>

HSE's REACH website: <http://www.hse.gov.uk/reach/about.htm>

HSE's GHS website: <http://www.hse.gov.uk/chemical-classification/index.htm>

15.8 Confined Spaces Regulations 1997

15.8.1 Introduction

These Regulations concern any work that is carried on in a place which is substantially (but not always entirely) enclosed, where there is a reasonably foreseeable risk of serious injury from conditions and/or hazardous substances in the space or nearby. Every year about 15 people are killed and a number seriously injured across a wide range of industries (e.g. from simple open top pits to complex chemical plants). Rescuers without proper training and equipment, often become the victims.

15.8.2 Definitions

Confined space – means any place, including any chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well or similar space, in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk.

Specified risk – means a risk to any person at work of:

- ▶ serious injury arising from a fire or explosion;
- ▶ loss of consciousness arising from an increase in body temperature;
- ▶ loss of consciousness or asphyxiation arising from gas, fume, vapour or the lack of oxygen;
- ▶ drowning arising from an increase in the level of liquid;
- ▶ asphyxiation arising from a free-flowing solid or because of entrapment by it.

15.8.3 Employers' duties – Regulation 3

Duties are placed on employers to:

- ▶ comply regarding any work carried out by employees;
- ▶ ensure, so far as practicable, that other persons (e.g. use competent contractors) comply regarding work in the employer's control.

The self-employed also have duties to comply.

15.8.4 Work in confined space – Regulation 4

- ▶ No person at work shall enter a confined space for any purpose unless it is not reasonably practicable to achieve that purpose without such entry.
- ▶ Other than in an emergency, no person shall enter, carry out work or leave a confined space otherwise than in accordance with a safe system of work, relevant to the specified risks.

15.8.5 Risk assessment

Risk assessment is an essential part of complying with these Regulations and must be done (under the MHSWR 1999) to determine a safe system of work. The risk assessment needs to follow a hierarchy of controls for compliance. This should start with the measures – both in design and procedures – that can be adopted to enable any work to be carried out outside the confined space.

The assessment must be done by a competent person and will form the basis of a safe system of work. This will normally be formalised into a specific permit to work, applicable to a particular task. The assessment will involve the following.

- (a) The general conditions to assess what may or may not be present. Consider:
 - ▶ what have been the previous contents of the space;
 - ▶ residues that have been left in the space, for example sludge, rust, scale and what may be given off if they are disturbed;
 - ▶ contamination which may arise from adjacent plant, processes, services, pipes or surrounding land, soil or strata;
 - ▶ oxygen deficiency and enrichment. There are very high risks if the oxygen content differs significantly from the normal level of 20.8%, if it is above this level increased flammability exists; if it is below then impaired mental ability occurs, with loss of consciousness under 16%;
 - ▶ that physical dimensions and layout of the space can affect air quality.
- (b) Hazards arising directly from the work being undertaken. Consider:
 - ▶ the use of cleaning chemicals and their direct effect or interaction with other substances;
 - ▶ sources of ignition for flammable dusts, gases, vapours, plastics and the like.
- (c) The need to isolate the confined space from outside services or from substances held inside, such as liquids, gases, steam, water, fire extinguishing media, exhaust gases, raw materials and energy sources.
- (d) The requirement for emergency rescue arrangements including trained people and equipment.

15

15.8.6 Safe system of work

The detailed precautions required will depend on the nature of the confined space and the actual work being carried out. The main elements of a safe system of work which may form the basis of a 'permit-to-work' are:

- ▶ the type and extent of supervision;
- ▶ competence and training of people doing the work;
- ▶ communications between people inside, and from inside to outside and to summon help;
- ▶ testing and monitoring the atmosphere for hazardous gas, fume, vapour, dust, etc. and for concentration of oxygen;
- ▶ gas purging of toxic or flammable substances with air or inert gas such as nitrogen;
- ▶ good ventilation, sometimes by mechanical means;
- ▶ careful removal of residues using equipment which does not cause additional hazards;
- ▶ effective isolation from gases, liquids and other flowing materials by removal of pieces of pipe, blanked off pipes, locked off valves;
- ▶ effective isolation from electrical and mechanical equipment to ensure complete isolation with lock off and a tag system with key security. Need to secure against stored energy or gravity fall of heavy presses etc.;
- ▶ if it is not possible to make the confined space safe, the provision of personal and respiratory protective equipment;
- ▶ supply of gas via pipes and hoses carefully controlled;
- ▶ access and egress to give quick unobstructed and ready access and escape;
- ▶ fire prevention;
- ▶ lighting, including emergency lighting;
- ▶ prohibition of smoking;
- ▶ emergencies and rescue;
- ▶ limiting of working periods and the suitability of individuals.

15.8.7 Emergency arrangements – Regulation 5

Before people enter a confined space, suitable and sufficient rescue arrangements must be set up. These must:

- ▶ reduce the risks to rescuers safely;
- ▶ include the provision and maintenance of suitable resuscitation equipment designed to meet the specified risks.

To be suitable and sufficient, arrangements will need to cover:

- ▶ rescue and resuscitation equipment;
- ▶ raising the alarm, alerting rescue and watch keeping;
- ▶ safeguarding the rescuers;
- ▶ fire safety precautions and procedures;

- ▶ control of adjacent plant;
- ▶ first-aid arrangements;
- ▶ notification and consultation with emergency services;
- ▶ training of rescuers and simulations of emergency situations;
- ▶ size of access openings to permit rescue with a breathing apparatus, harnesses, fall arrest gear, lifelines, which is the normal suitable respiratory protection and rescue equipment for confined spaces.

15.8.8 Training

Specific, detailed and frequent training is necessary for all people concerned with confined spaces, whether they are acting as rescuers, watchers or those carrying out the actual work inside the confined space. The training will need to cover all procedures and the use of equipment under realistic simulated conditions.

15.8.9 Further information

Guidance on Permit-to-Work Systems: A Guide for the Petroleum, Chemical and Allied Industries. HSG250. HSE Books, 2005, ISBN 978 0 7176 2943 5. <http://www.hse.gov.uk/pubns/books/hsg250.htm>

Respiratory Protective Equipment at Work: A Practical Guide HSG53 (Fourth Edition), 2013, HSE Books, ISBN 978 0 7176 6454 2. <http://www.hse.gov.uk/pubns/books/hsg53.htm>

Safe Work in Confined Spaces. Confined Spaces Regulations 1997. Approved Code of Practice, Regulations and Guidance L101 (Third Edition), 2014. HSE Books, ISBN 978 0 7176 6622 5. <http://www.hse.gov.uk/pubns/books/l101.htm>

Safe work in confined spaces INDG258(rev 1), 2013. HSE Books, ISBN 978 0 7176 1442 5. <http://www.hse.gov.uk/pubns/indg258.pdf>

15.9 Construction (Design and Management) (CDM) Regulations 2015

15.9.1 Introduction and background

The CDM 2015 regulations were introduced in April 2015.

The policy objectives behind the CDM 2015 are to:

- ▶ maintain or improve worker protection;
- ▶ simplify the regulatory package;
- ▶ improve health and safety standards on small construction sites;
- ▶ implement the Temporary or Mobile Construction Sites Directive (TMCS) in a proportionate way;
- ▶ discourage bureaucracy; and
- ▶ meet better regulation principles.

The HSE commissioned extensive external research which was published in April 2012 and along with the

other elements of the evaluation the broad conclusions were that:

- ▶ CDM 2007 was viewed more positively by duty-holders than the 1994 version;
- ▶ its broad structure was fit for purpose;
- ▶ problems generally arose through mis- and over-interpretation of the Regulations;
- ▶ significant concerns remained, however, in several areas:
 - ▶ the Regulations had not borne down on bureaucracy as hoped;
 - ▶ the Regulations had led to an industry approach to competence which was heavy-handed and in many cases burdensome, particularly on SMEs;
 - ▶ the coordination function in the pre-construction phase was not in many cases well embedded.

The HSE considered the implementation of the Temporary or Mobile Construction Sites Directive (TMCS) and the Government's policy on implementation of EU Directives. The UK remains committed to fully implementing EU Directives and the proposed changes to the Regulations will meet that aim.

The balance of where serious and fatal injuries occur has shifted dramatically in the past 10–15 years. Two-thirds or more of fatalities now occur on small sites – sites where fewer than 15 people work – which is the reverse of the historical picture. The larger, more structured part of the industry has made significant progress in improving its management of health and safety risks over this time frame. Its motivation for achieving higher standards is often one of continuous improvement and innovation leading to best practice, rather than just meeting regulatory requirements.

15.9.2 Main changes and outline of regulations

The main changes in comparison with the CDM Regulations 2007 include the following:

- (a) These Regulations apply to all construction projects in Great Britain, and all clients whether or not a person is acting in the course or furtherance of a business (regulation 2(1) and 3(1)).
- (b) If a client is a domestic client, the duties in regulations 4(1) to (7) and 6 will be carried out by the contractor, or principal contractor depending on the number of contractors. The client can agree in writing for the principal designer to carry out the duties.
- (c) Site surveys and pre-construction archaeological investigations are not included within the scope of the definition of construction work (regulation 2(1)).
- (d) Pre-construction information has now been defined in regulation 2(1) rather than in a Schedule.

- (e) The role of a CDM coordinator has been omitted and instead a new role of a principal designer has been created (regulations 2(1) and 5).
- (f) The client's duty to appoint a principal designer or principal contractor in writing is triggered where there is more than one contractor (regulation 5), rather than the previous threshold for notification under the CDM Regulations 2007.
- (g) The duties of the principal designer are provided for in regulation 11.
- (h) The duties of designers are retained in regulations 9 and 10.
 - (i) A construction phase plan is required for all projects
 - (j) Specific risks like excavation or working at height must have control measures included in the construction phase plan (regulation 12(2) and Schedule 3).
 - (k) The principal contractor's duties are set out in regulations 13 and 14.
 - (l) The duties of contractors remain largely the same as the CDM Regulations 2007 and are set out in regulation 15.
 - (m) The notification requirement has been amended and is now provided for in regulation 6.
 - (n) The requirement for the contents of inspection reports are now provided for in regulation 24 rather than a separate Schedule (previously Schedule 3 of the CDM Regulations 2007 set out the requirements).
 - (o) The Secretary of State will carry out a review of the Regulations in accordance with the provisions of regulation 39.

The Regulations are divided into five parts. Part 1 of the Regulations deals with matters of interpretation and application. The Regulations apply to all construction work in Great Britain and its territorial waters, and apply to both employers and self-employed without distinction.

Part 2 covers general client duties which apply to all construction projects, including the requirements for notification.

Part 3 sets out health and safety duties and roles which apply to all construction projects.

Part 4 sets out the general requirements for all construction sites, and covers physical safeguards which need to be provided to prevent danger. Duties to achieve these standards are held by contractors who actually carry out the work, irrespective of whether they are employers or are self-employed. Duties are also held by those who do not do construction work themselves, but control the way in which the work is done. In each case, the extent of the duty is in proportion to the degree of control which the individual or organisation has over the work in question.

This does not mean that everyone involved with design, planning or management of the project legally

must ensure that all the specific requirements in Part 4 are complied with. They only have duties if, in practice, they exercise sufficient control over the actual working methods, safeguards and site conditions. If, for example, a client specifies that a particular job is done in a particular way then the client will have a duty to make sure that their instructions comply with the requirements.

Contractors must not allow work to start or continue unless the necessary safeguards are in place, whether they are providing the safeguards, or using something, for example a scaffold, supplied by someone else.

Part 5 of the Regulations covers issues of enforcement in respect of fire; transitional provisions which will apply during the period when the regulations come into force; review; amendments and revocations of other legislation.

15.9.3 Definition of construction and client – Regulation 2

Construction work

'Construction work' means the carrying out of any building, civil engineering or engineering construction work and includes:

- the construction, alteration, conversion, fitting-out, commissioning, renovation, repair, upkeep, redecoration or other maintenance (including cleaning which involves the use of water or an abrasive at high pressure or the use of corrosive or toxic substances), decommissioning, demolition or dismantling of a structure;
- the preparation for an intended structure, including site clearance, exploration, investigation (but not site survey) and excavation (but not pre-construction archaeological investigations), and the clearance or preparation of the site or structure for use or occupation at its conclusion;
- the assembly on site of pre-fabricated elements to form a structure or the disassembly on site of pre-fabricated elements which, immediately before such disassembly, formed a structure;
- the removal of a structure or of any product or waste resulting from demolition or dismantling of a structure or from disassembly of pre-fabricated elements which immediately before such disassembly formed such a structure;
- the installation, commissioning, maintenance, repair or removal of mechanical, electrical, gas, compressed air, hydraulic, telecommunications, computer or similar services which are normally fixed within or to a structure.

This means that there are some things which may take place on a construction site, like tree planting and horticulture work, putting up marquees, positioning

lightweight panels in an open plan office, archaeological exploration and surveying, which are not construction work.

Client

'Client' means any person for whom a project is carried out; 'domestic client' means a client for whom a project is being carried out which is not in the course of the furtherance of a business of that client.

Note:

Typical operating and owning costs of a building are in the ratio:

- ▶ 1 for construction costs
- ▶ 5 for maintenance and building operating costs
- ▶ 200 for business operating costs.

Source: Royal Academy of Engineering report on 'Long Term costs of Owning and Using Buildings'

Part 2 – Client duties

15.9.4 Client duties for managing projects – Regulation 4

A client must:

- ▶ make arrangements for managing a project to ensure that construction work is carried out safely;
- ▶ ensure the welfare requirements in Schedule 2 are complied with;
- ▶ take reasonable steps to ensure that the arrangements are maintained and reviewed throughout the project;
- ▶ provide pre-construction information to every designer and contractor appointed or being considered for appointment;
- ▶ ensure before the construction phase begins that the principal contractor (or contractor if only one) draws up a construction phase plan;
- ▶ ensure that the principal designer prepares an appropriate health and safety file for the project which:
 - ▷ includes information which may be needed for subsequent projects;
 - ▷ is revised from time to time;
 - ▷ is kept available for inspection;
 - ▷ is passed on if interest in the project passes to another client. If a client disposes of the client's interest in the structure, the client complies with the duty in paragraph 5(b)(iii) by providing the health and safety file to the person who acquires the client's interest in the structure and ensuring that that person is aware of the nature and purpose of the file;

- ▶ ensure that the principal designer complies with their duties under regulations 11 and 12;
- ▶ ensure that the principal contractor complies with regulations 12 to 14.

SCHEDULE 1**PARTICULARS TO BE NOTIFIED TO THE EXECUTIVE**

1. Date of forwarding.
2. Exact address of the construction site.
3. The name of the local authority where the site is located
4. A brief description of the project and the construction work which it includes.
5. Contact details of the client (name, address, telephone number and any e-mail address).
6. Contact details of the CDM co-ordinator (name, address, telephone number and any e-mail address).
7. Contact details of the principal contractor (name, address, telephone number and any e-mail address).
8. Date planned for the start of the construction phase.
9. The time allowed by the client to the principal contractor referred to in Regulation 15(b) for planning and preparation for construction work.
10. Planned duration of the construction phase.
11. Estimated maximum number of people at work on the construction site.
12. Planned number of contractors on the construction site.
13. Name and address of any contractor already appointed.
14. Name and address of any designer already engaged.
15. A declaration signed by or on behalf of the client that he is aware of his duties under these Regulations.

Figure 15.2 (a) CDM 2015 – Schedule 1

15.9.5 Appointment of principal designer and contractor – Regulation 5

Where it is foreseeable that more than one contractor will be working on the project at any time the client must appoint in writing:

- ▶ A principal designer for the responsibilities in regulations 11 and 12.
- ▶ A principal contractor for the responsibilities in regulations 12 to 14.

If an appointment is not made the client must fulfil either/or both of these roles. This part of regulation 5 (3) and (4) does not apply to domestic clients.

15.9.6 Notification – Regulation 6

The client must notify the HSE using the particulars in Schedule 1 (Figure 15.2) if the construction work on a site is scheduled to:

- ▶ last longer than 30 working days and have more than 20 workers working simultaneously at any point in the project; or
- ▶ exceed 500 person days.

The notice must be clearly displayed on the site in a form that can be read by any worker engaged in the construction work. It must be updated if necessary.

15.9.7 Application to domestic clients – Regulation 7

Unless there is a written agreement between the client and the principal designer, the duties in regulations 4(1) to (7) and 6, must be carried out by:

- ▶ the contractor or principal contractor where there is more than one;
- ▶ the principal designer where there is a written agreement that they will fulfil those duties.

Where no appointment is made:

- ▶ the designer in control of the pre-construction phase is the principal designer; and
- ▶ the contractor in control of the construction phase is the principal contractor.

Regulation 5(3) and (4) does not apply (see 15.9.5).

Part 3 – Health and safety duties and roles

15.9.8 General duties – Regulation 8

Designers and contractors (including principal) appointed to work on a project must have: skills, knowledge and experience, and, if an organisation, the organisational capability, to fulfil the role they are given. They must not accept the appointment unless they fulfil these conditions.

Any person responsible for appointing a designer or contractor must take reasonable steps to satisfy themselves that the designer or contractor fulfils the conditions of the paragraph above.

Any duty-holders must cooperate with others on the same or adjoining construction sites.

A person involved in a project has a duty to report anything they are aware of which could endanger them or others.

Information must be comprehensible and provided as soon as is practicable.

15.9.9 Duties of designers – Regulations 9 and 10

A designer must:

- ▶ before starting work be satisfied that the client is aware of their duties under CDM 2015;
- ▶ take into account the general principles of prevention to eliminate risks for any one:
 - ▶ working or liable to be affected by construction work;
 - ▶ maintaining or cleaning a structure, or
 - ▶ using a structure designed as a workplace;
- ▶ if elimination is not possible the designer must:
 - ▶ take steps to reduce and control the risks through the design process;
 - ▶ provide information about the risks to the principal designer;

- ▶ ensure appropriate information is contained in the health and safety file
- ▶ provide with the design sufficient information to help clients, other designers and contractors to fulfil their duties under CDM 2015

Regulation 10 requires that if a design comes from outside Great Britain the person who commissions it or the client must ensure that regulation 9 is complied with.

15.3.10 Duties of principal designer in relation to health and safety at the pre-construction phase - Regulation 11

A principal designer must plan, manage, monitor and coordinate the pre-construction phase of a project, taking into account the general principles of prevention and the content of the construction phase plan and health and safety file to ensure:

- ▶ that the project is carried out without risk to health and safety with regard to design, technical, organisational and know required aspects;
- ▶ identify and eliminate or control risks that are foreseeable to people:
 - ▶ doing or affected by construction work;
 - ▶ maintaining or cleaning structures; or
 - ▶ using structures designed and installed;
- ▶ all designers comply with their duties in regulation 10;
- ▶ all people concerned with the pre-construction phase cooperate with the client, the principal designer and each other;
- ▶ for the client, the client to provide the pre-construction information and provide pre-construction information to other designers and contractors appointed or being appointed, in a convenient form;
- ▶ liaise with the principal contractor for the duration of the project particularly over the preparation of the construction phase plan.

15.3.11 Construction phase plan and health and safety file

The principal contractor must take appropriate arrangements for a construction phase plan and health and safety file. The client must also act:

- ▶ health and safety management;
- ▶ plan and set the project of law information on the site and
- ▶ maintain a specific measures in work with Schedule 1 of the regulations.

And:

- ▶ Principal designer must assist the principal contractor to prepare the construction phase plan providing all relevant information from the client and designers.

- ▶ Principal contractor must review, update and sign as necessary the construction phase plan.
- ▶ Principal designer must prepare a health and safety file during the pre-construction phase.
- ▶ Principal designer must review, update and sign the health and safety file as necessary.
- ▶ Principal contractor must provide relevant information to the principal designer for the health and safety file.

And:

- ▶ If the appointment of the principal designer terminated before the end of the project the health and safety file must be passed on to the principal contractor who must then keep it reviewed, signed and revised as needed.
- ▶ At the end of the project the health and safety file must be passed to the client.

SCHEDULE 1 WORK INVOLVING PARTICULAR RISK

- 1 Work which puts workers at risk of falls from the engagement in a complete or 'falling' from a height or the fall in particular approved by the issuer of the licence or process used in the construction of the project work in 1992.
- 2 Work which puts workers at risk from chemical, biological substances or infectious agents or from the release of health of workers or involving a legal requirement for health monitoring.
- 3 Work with a strong vibration reducing the frequency of use must meet under regulation 10 of the Control of Vibration Regulations 2005.
- 4 Work with high voltage power lines.
- 5 Work involving working in the field of view.
- 6 Work with a significant amount of dust or noise.
- 7 Work carried out by divers being a water-based activity.
- 8 Work which puts workers in contact with a compressed gas cylinder.
- 9 Work involving the use of explosives.
- 10 Work involving the use of a substance or substance that is particularly dangerous.

Figure 15.10 Construction phase plan and health and safety file

15.3.12 Duties of the principal contractor in relation to health and safety at the construction phase - Regulation 12

The principal contractor must plan, manage, monitor and coordinate the construction phase taking into account the general principles of prevention to ensure the client:

- ▶ the project is carried out without risk to health and safety with regard to design, technical, organisational and know required aspects;
- ▶ cooperation between construction is achieved;
- ▶ the implementation of legal requirements by construction is completed.

- employ and self-employed apply general principles of prevention consistently and follow the construction phase plan;
- suitable site induction is provided;
- access to unauthorised persons is controlled;
- Scheme 2 welfare facilities are provided throughout the construction phase;
- there is liaison with the principal designer throughout the project, particularly regarding information for the health and safety file and management of the construction phase plan.

15.2.12 Principal contractor's duties to consult and engage with workers – Regulation 14

General contract must:

- make all necessary arrangements to enable people under its control effectively to develop safety measures and their effectiveness;
- appoint workers or their representatives in good time or both as an advisory team, unless already consulted by their employer;
- consult the workers or their representatives on matters on their scope of health and safety related to their project except:
 - matters which do not affect the interests of general security;
 - matters which involve a legal obligation;
 - when the information relates specifically to an individual without their consent;
 - when disclosure would cause substantial damage to the principal contractor's undertaking or the understanding of the fact supplied to the workers;
 - when the information was obtained by the principal contractor with legal proceedings.

15.2.14 Duties of construction workers – Regulation 15

General contract must:

- if an individual construction worker on a project which is notified to the Health and Safety Executive under CMA 1991;
- if an individual worker on the way construction work is done, ensure that a construction phase plan is in place to support the way in which the work is done; technical, organisational and other relevant aspects;
- when there is a self-employed working on a project, ensure that a construction phase plan is in place to support the way in which the work is done; technical, organisational and other relevant aspects; measures of CMA 1991, CMA 1992, CMA 1993;
- if a worker is engaged to perform work that does not require the necessary skills, knowledge,

training and experience to carry out the allocated tasks safely;

- provide any employee or person in their control with appropriate supervision, information and instruction to ensure safety of the project including:
 - 1 suitable site induction;
 - 2 emergency procedure;
 - 3 information on risks to their health and safety either identified by their risk assessment or from another contractor's operations;
 - 4 any other information necessary;
- not start work unless access to unauthorised persons is controlled;
- ensure that Scheme 2 welfare facilities are completed with to employees and others under the control.

15.2.15 Part 4 General requirements for all construction sites

The CHSV Regulation 198 was revised to CMA 1997 which has been replaced by CMA 2015. Under the work at height provisions Regulation 12, Part 6, the requirements form the basis of Part 4 and Scheme 2 Welfare facilities of the CMA 2015 Regulations.

Some issues already covered by the previous Regulations are particularly important in construction. These include safety management including, Safety file and an inspector. CMA 2015 updates aspects of the previous Regulations equipment, although this was not legally necessary. The issues covered by the 4 aspects of construction projects are now as follows.

General application of regulation 17-20 – Regulation 17

Take into account with the same regard to the contractor as other persons who control the work in which construction work is carried out.

Take into account workers in control of the work in which they are engaged the health and safety of themselves or another person.

Safe places of construction work – Regulation 17

The regulation requires that:

- safe places and spaces to be used in work;
- equipment to be used in safety;
- the work to be carried out in a safe manner; avoid workers in situations;
- consider the risks of work with objects, apparatus and the workers.

Good order and site security – Regulation 18

Requires that all parts of a construction be kept, fair, in good order and in a reasonable state of cleanliness.

Where necessary in the interests of health and safety the site's perimeter should be identified, signed and fenced off.

No timber or other materials with projecting nails or similar sharp objects shall be used or allowed to remain if they could be a source of danger.

Stability of structures – Regulation 19

All practical steps must be taken to ensure that:

- ▶ any new or existing structure which may be, or become, weak does not collapse accidentally;
- ▶ temporary supporting structures are designed, installed and maintained so as to withstand all foreseeable loads;
- ▶ a structure is not overloaded so as to be a source of danger.

Demolition or dismantling – Regulation 20

Demolition or dismantling must be planned and carried out so as to prevent danger or reduce it to as low a level as is reasonably possible.

Arrangements must be recorded in writing before the work takes place.

Explosives – Regulation 21

Explosives, fair, must be stored, transported and used safely and securely.

Explosives may only be fired if suitable and sufficient steps have been taken to ensure no one is exposed to risk of injury.

Excavations – Regulation 22

All practicable steps shall be taken to prevent danger to people including, where necessary, supports or battering to ensure that:

- ▶ excavations do not collapse accidentally;
- ▶ no material from side, roof or adjacent is dislodged or falls;
- ▶ a person is prevented from being buried or trapped by a fall of material;
- ▶ persons, work equipment or any accumulation of material are prevented from falling into the excavation;
- ▶ any part of an excavation or ground adjacent is not overloaded by work equipment or material.

No construction work may be carried out in an excavation where any supports or battering has been provided unless it has been inspected by a competent person:

- ▶ at the start of the shift (only one report required every 7 days);
- ▶ after any event likely to affect the strength or stability of the excavation;
- ▶ after any material accidentally falls or is dislodged;
- ▶ the person inspecting is satisfied that it is safe.

Where the person who carries out the inspection has informed the person on whose behalf the inspection was carried out, work must cease until the relevant matters have been corrected.

Cofferdams and caissons – Regulation 23

Every cofferdam or caisson must be:

- ▶ suitably designed and constructed;
- ▶ appropriately equipped so that people can gain shelter or escape if water or material enters;
- ▶ properly maintained.

A cofferdam or caisson may be used to carry out construction only if:

- ▶ it and any work equipment and materials which affect its safety have been inspected by a competent person:

- ▶ at the start of the shift (only one report required every 7 days);
- ▶ after any event likely to affect its strength or stability;
- ▶ the person inspecting is satisfied that it is safe.

Where the person who carries out the inspection has informed the person on whose behalf the inspection was carried out, work must cease until the relevant matters have been corrected.

Reports of inspection – Regulation 24

Before the end of the shift in which the report was completed, the person who carries out the inspection under Regulation 22 or 23 must:

- ▶ inform the person for whom they carried out the inspection if they are not satisfied that construction work can be carried out safely;
- ▶ prepare a report with the particulars shown in Figure 15.3.

A copy of the report must be provided within 24 hours of the relevant inspection. If the inspector is an employee or works under someone else's control, that person must ensure that these duties are performed.

Records must be kept at the site where the inspection was carried out until the work is complete and then for three months. Extracts must be provided for an inspector as and when they require. Only one report is required if more than one report is produced under each shift requirement of regulation 22(4)(a)(i) or 23(2)(a)(i) within 7 days.

Inspection reports which must include—

- (i) the name and address of the person on whose behalf the inspection was carried out;
- (ii) the location of the place of construction work inspected;
- (iii) a description of the place of construction work or part of that place inspected (including any work equipment and materials);
- (iv) the date and time of the inspection;
- (v) the details of any matter identified that could give rise to a risk to the safety of any person;
- (vi) details of any action taken as a result of any matter identified in paragraph (v);
- (vii) the details of any further action considered necessary, and
- (viii) the name and position of the person making the report.

Figure 15.3 Content of inspection reports

Energy distribution installations – Regulation 25

Energy distribution installations must be suitably located, checked and clearly indicated.

Where there is a risk from electric power cables:

- ▶ they should be routed away from the risk areas; or
- ▶ the power should be cut off; or
- ▶ if the above safety measures are not reasonably practicable suitable warning notices, with barriers to exclude work equipment and suspended protections where vehicles have to pass underneath, should be provided; or
- ▶ something equally as safe must be done.

No construction work which is liable to create a risk to health or safety from an underground service, or from damage to or disturbance of it, shall be carried out unless suitable and sufficient steps have been taken to prevent such risk, so far as is practicable.

Prevention of drowning – Regulation 26

Where persons could fall into water or other liquid, steps must be taken to:

- ▶ prevent, so far as is practicable, people from falling;
- ▶ minimise the risk of drowning if people fall;
- ▶ provide, use and maintain suitable rescue equipment to ensure prompt rescue.

Transport to work by water must be suitable and sufficient and any vessel must not be overcrowded or overloaded.

Traffic routes – Regulation 27

Every construction site shall be organised in such a way that, so far as is practicable, pedestrians and vehicles can move safely.

Traffic routes shall be suitable for the persons or vehicles using them, sufficient in number, in suitable positions and of sufficient size.

Steps must be taken to ensure that:

- ▶ pedestrians or vehicles may use them without causing danger to the health or safety of persons near them;
- ▶ any door or gate for pedestrians which leads onto a traffic route is sufficiently separated from it to enable them from a place of safety to see any approaching vehicle;
- ▶ there is sufficient separation between vehicles and pedestrians to ensure safety or, where this is not reasonably practicable:
 - (i) there are provided other means for the protection of pedestrians;
 - (ii) there are effective arrangements for warning any person liable to be crushed or trapped by any vehicle of its approach;
- ▶ any loading bay has at least one exit point for the exclusive use of pedestrians;
- ▶ where it is unsafe for pedestrians to use a gate intended primarily for vehicles, one or more doors for pedestrians provided in the immediate vicinity of the gate is clearly marked and is kept free from obstruction.

Every traffic route must be:

- ▶ indicated by suitable signs;
- ▶ regularly checked;
- ▶ properly maintained.

No vehicle shall be driven on a traffic route unless, so far as is practicable, that traffic route is free from obstruction and permits sufficient clearance.

Vehicles – Regulation 28

The unintended movement of any vehicle must be prevented or controlled.

Suitable and sufficient steps shall be taken to ensure that, where a person may be endangered by the movement of any vehicle, the person having effective control of the vehicle shall give suitable and sufficient warning.

Any vehicle being used for the purposes of construction work, shall, when being driven, operated or towed:

- ▶ be driven, operated or towed in a safe manner;
- ▶ be loaded so that it can be driven, operated or towed safely.

No person shall ride on any vehicle being used for the purposes of construction work except in a safe place provided.

No person shall remain on any vehicle during the loading or unloading of any loose material unless a safe place of work is provided and maintained.

Suitable measures must be taken to prevent any vehicle from falling into any excavation or pit, or into water, or overrunning the edge of any embankment or earthwork.

Prevention of risk from fire, flooding and asphyxiation – Regulation 29

Steps must be taken to prevent injury arising from:

- ▶ fires or explosions;
- ▶ flooding; or
- ▶ substances liable to cause asphyxiation.

Emergency procedures – Regulation 30

Where necessary, emergency procedures must be prepared and, where necessary, implemented to deal with any foreseeable emergency. They must include procedures for any necessary evacuation of the site or any part thereof.

The arrangements must take account of:

- ▶ the type of work for which the construction site is being used;
- ▶ the characteristics and size of the construction site and the number and location of places of work on that site;
- ▶ the work equipment being used;
- ▶ the number of persons likely to be present on the site at any one time;
- ▶ the physical and chemical properties of any substances or materials on or likely to be on the site.

Steps must be taken to make people on site familiar with the procedures and test the procedures at suitable intervals.

Emergency routes and exits – Regulation 31

Where necessary a sufficient number of suitable emergency routes and exits shall be provided to enable any person to reach a place of safety quickly in the event of danger.

An emergency route or exit (or, as appropriate, traffic route) provided must:

- ▶ lead as directly as possible to an identified safe area;
- ▶ be kept clear and free from obstruction and, where necessary, provided with emergency lighting so that such emergency route or exit may be used at any time;
- ▶ be indicated by suitable signs.

Fire detection and fire-fighting – Regulation 32

Where necessary, duty-holders must provide suitable and sufficient:

- ▶ fire-fighting equipment; and
- ▶ fire detection and alarm systems which shall be suitably located.

The equipment must be examined and tested at suitable intervals, properly maintained and suitably indicated by signs. If non-automatic, it must be easily accessible.

Every person at work on a construction site shall, if necessary, be instructed in the correct use of any fire-fighting equipment which it may be necessary for them to use. Where a work activity may give rise to a particular risk of fire, a person shall not carry out such work unless suitably instructed.

Fire-fighting equipment must be indicated by suitable signs.

Fresh air – Regulation 33

Steps must be taken to ensure, so far as is reasonably practicable, that every place of work or approach has sufficient fresh or purified air to ensure that the place or approach is safe and without risks to health. Any plant used for the provision of fresh air must include, where necessary, an effective device to give visible or audible warning of any failure of the plant.

Temperature and weather protection – Regulation 34

Steps must be taken to ensure, so far as is reasonably practicable, during working hours the temperature at any place of work indoors is reasonable having regard to its purpose.

Every place of work outdoors must, where necessary, so far as is reasonably practicable, and having regard to the purpose for which that place is used and any protective clothing or work equipment provided, be so arranged that it provides protection from adverse weather.

Lighting – Regulation 35

Every place of work and approach thereto and every traffic route shall be provided with suitable and sufficient lighting, which shall be, so far as is reasonably practicable, by natural light.

The colour of any artificial lighting provided shall not adversely affect or change the perception of any sign or signal provided for the purposes of health and safety.

Suitable and sufficient secondary lighting shall be provided in any place where there would be a risk to the health or safety of any person in the event of failure of primary artificial lighting.

15.9.16 Welfare facilities – Schedule 2

Sanitary conveniences

- (1) Suitable and sufficient sanitary conveniences must be provided or made available at readily accessible places.
- (2) So far as is reasonably practicable, rooms containing sanitary conveniences must be adequately ventilated and lit.
- (3) So far as is reasonably practicable, sanitary conveniences and the rooms containing them must be kept in a clean and orderly condition.

- (4) Separate rooms containing sanitary conveniences must be provided for men and women, except where and so far as each convenience is in a separate room, the door of which is capable of being secured from the inside.

Washing facilities

2. (1) Suitable and sufficient washing facilities, including showers if required by the nature of the work or for health reasons, must, so far as is reasonably practicable, be provided or made available at readily accessible places.
- (2) Washing facilities must be provided—
- in the immediate vicinity of every sanitary convenience, whether or not also provided elsewhere; and
 - in the vicinity of any changing rooms required by paragraph 4, whether or not provided elsewhere.
- (3) Washing facilities must include—
- a supply of clean hot and cold, or warm, water (which must be running water so far as is reasonably practicable);
 - soap or other suitable means of cleaning; and
 - towels or other suitable means of drying.
- (4) Rooms containing washing facilities must be sufficiently ventilated and lit.
- (5) Washing facilities and the rooms containing them must be kept in a clean and orderly condition.
- (6) Subject to paragraph (7), separate washing facilities must be provided for men and women, except where they are provided in a room the door of which is capable of being secured from inside and the facilities in each room are intended to be used by only one person at a time.
- (7) Sub-paragraph (6) does not apply to facilities which are provided for washing hands, forearms and the face only.

Drinking water

3. (1) An adequate supply of wholesome drinking water must be provided or made available at readily accessible and suitable places.
- (2) Where necessary for reasons of health or safety, every supply of drinking water must be conspicuously marked by an appropriate sign.
- (3) Where a supply of drinking water is provided, a sufficient number of suitable cups or other drinking vessels must also be provided, unless the supply of drinking water is in a jet from which persons can drink easily.

Changing rooms and lockers

4. (1) Suitable and sufficient changing rooms must be provided or made available at readily accessible places if a worker—
- has to wear special clothing for the purposes of construction work; and
 - cannot, for reasons of health or propriety, be expected to change elsewhere.
- (2) Where necessary for reasons of propriety, there must be separate changing rooms for, or separate use of rooms by, men and women.
- (3) Changing rooms must—
- be provided with seating; and
 - include, where necessary, facilities to enable a person to dry any special clothing and any personal clothing or effects.
- (4) Suitable and sufficient facilities must, where necessary, be provided or made available at readily accessible places to enable persons to lock away—
- any special clothing which is not taken home;
 - their own clothing which is not worn during working hours; and
 - their personal effects.

Facilities for rest

5. (1) Suitable and sufficient rest rooms or rest areas must be provided or made available at readily accessible places.
- (2) Rest rooms and rest areas must—
- be equipped with an adequate number of tables and adequate seating with backs for the number of persons at work likely to use them at any one time;
 - where necessary, include suitable facilities for any woman at work who is pregnant or who is a nursing mother to rest lying down;
 - include suitable arrangements to ensure that meals can be prepared and eaten;
 - include the means for boiling water; and
 - be maintained at an appropriate temperature.

15.9.17 Part 5 General

Enforcement in respect of fire – Regulation 36

This regulation is given in full.

- (1) As regards regulations 30 and 31 the enforcing authority in respect of a construction site which is contained within, or forms part of, premises which are occupied by persons other than those carrying out construction work or any activity related to this work, in so far as those regulations relate to fire are—

- (a) in England and Wales the enforcing authority within the meaning of article 25 of the Regulatory Reform (Fire Safety) Order 2005(a) in respect of premises to which that Order applies; or
- (b) in Scotland the enforcing authority within the meaning of Section 61 of the Fire (Scotland) Act 2005(b) in respect of premises to which Part 3 of that Act applies.

15.9.18 Further information

Asbestos Essentials HSG 210 (third edition), 2012, ISBN 978 0 7176 6503 7 <http://www.hse.gov.uk/pubns/books/hsg210.htm>

Asbestos: The licensed contractors' guide HSG247, 2006, ISBN 978 0 7176 2874 2 <http://www.hse.gov.uk/pubns/books/hsg247.htm>

Electricity in Construction HSE website <http://www.hse.gov.uk/electricity/information/construction.htm>

Fire Safety in Construction Work HSG 168rev, 2010, HSE Books, ISBN 978 0 7176 6345 3 <http://www.hse.gov.uk/pubns/books/hsg168.htm>

Health and Safety in Construction HSG150 (rev 3), 2006, HSE Books, ISBN 978 0 7176 6182 4 (due for revision). <http://www.hse.gov.uk/pubns/priced/hsg150.pdf>

Health and Safety in Roof Work (Fourth Edition), HSG33, 2012, HSE Books, ISBN 978 0 7176 6527 3. <http://www.hse.gov.uk/pubns/books/hsg33.htm>

Safe Use of Vehicles on Construction Sites HSG 144, 2009, HSE Books, ISBN 97 0 7176 6291 3. <http://www.hse.gov.uk/pubns/books/hsg144.htm>

Protecting the public: Your next move HSG151, 2009, ISBN 978 0 7176 6294 4 <http://www.hse.gov.uk/pubns/books/hsg151.htm>

Guidance on The Construction (Design and Management) Regulations 2015 L153 <http://www.hse.gov.uk/pubns/books/l153.htm>

Industry Guidance for clients, contractors, designers, principal designers, principal contractors and workers see <http://www.citb.co.uk/health-safety-and-other-topics/health-safety/construction-design-and-management-regulations/>

15.10 Health and Safety (Consultation with Employees) Regulations 1996

15.10.1 Application

These Regulations apply to all employers and employees in Great Britain except:

- ▶ where employees are covered by safety representatives appointed by recognised trade unions under the Safety Representatives and Safety Committees Regulations 1977 (note in

workplaces where there is trade union recognition but either the trade union has not appointed a safety representative, or the union safety representative does not cover the whole workforce, the Health and Safety (Consultation with Employees) Regulations will apply);

- ▶ domestic staff employed in private households;
- ▶ crew of a ship under the direction of the master.

15.10.2 Employers' duty to consult - Regulation 3

The employer must consult relevant employees in good time with regard to:

- ▶ the introduction of any measure which may substantially affect their health and safety;
- ▶ the employer's arrangements for appointing or nominating competent persons under the Management of Health and Safety at Work Regulations 1999;
- ▶ any information required to be provided by legislation;
- ▶ the planning and organisation of any health and safety training required by legislation;
- ▶ the health and safety consequences to employees of the introduction of new technologies into the workplace.

The guidance emphasises the difference between informing and consulting. Consultation involves listening to employees' views and taking account of what they say before any decision is taken.

15.10.3 Persons to be consulted - Regulation 4

Employers must consult with either:

- ▶ the employees directly; or
- ▶ one or more persons from a group of employees who were elected by employees in that group to represent them under these regulations. They are known as 'Representative(s) of Employee Safety' (ROES).

Where ROES are consulted, all employees represented must be informed of:

- ▶ the names of ROES;
- ▶ the group of employees represented.

Employers shall not consult a ROES if:

- ▶ the ROES does not wish to represent the group;
- ▶ the ROES has ceased to be employed in that group;
- ▶ the election period has expired;
- ▶ the ROES has become incapacitated from carrying out the necessary functions.

If an employer decides to consult directly with employees, they must inform them and ROES of that fact. Where no ROES are elected, employers will have to consult directly.

15.10.4 Duty to provide information – Regulation 5

Employers must provide enough information to enable ROES to participate fully and carry out their functions. This will include:

- ▶ what the likely risks and hazards arising from their work may be;
- ▶ reported accidents and diseases etc. under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013;
- ▶ the measures in place, or which will be introduced, to eliminate or reduce the risks;
- ▶ what employees ought to do when encountering risks and hazards.

An employer need not disclose information which:

- ▶ could endanger national security;
- ▶ violates a legal prohibition;
- ▶ relates specifically to an individual without their consent;
- ▶ could substantially hurt the employer's undertaking or infringe commercial security;
- ▶ was obtained in connection with legal proceedings.

15.10.5 Functions of ROES – Regulation 6

ROES have the following functions (but no legal duties):

- ▶ to make representations to the employer on potential hazards and dangerous occurrences related to the group of employees represented;
- ▶ to make representations to the employer on matters affecting the general health and safety of relevant employees;
- ▶ to represent the group of employees for which they are the ROES in consultation with inspectors.

15.10.6 Training, time off and facilities – Regulation 7

Where an employer consults ROES, they shall:

- ▶ ensure that each ROES receives reasonable training at the employer's expense;
- ▶ allow time off with pay during ROES working hours to perform the duties of a ROES and while the ROES is a candidate for election;
- ▶ provide such other facilities and assistance that ROES may reasonably require.

15.10.7 Civil liability and complaints – Regulation 9 and Schedule 2

Breach of these Regulations does not confer any right of action in civil proceedings subject to Regulation 7(3) and Schedule 2 relating to complaints to industrial tribunals.

A ROES can complain to an industrial tribunal that:

- ▶ their employer has failed to permit time off for training or to be a candidate for election;

- ▶ their employer has failed to pay them as set out in Schedule 1 to the Regulations.

15.10.8 Elections

The guidance lays down some ideas for the elections, although there are no strict rules.

ROES do not need to be confined to consultation related to these Regulations. Some employers have ROES sitting on safety committees and taking part in accident investigation similarly to union Safety Representatives.

15.10.9 Further information

Consulting Workers on Health and Safety. Safety Representatives and Safety Committees Regulations 1977 (as amended) and Health and Safety (Consultation with Employees) Regulations 1996 (as amended). Approved Code of Practice and Guidance L146, HSE Books, 2012, ISBN 978 0 7176 6461 0. <http://www.hse.gov.uk/pubns/books/l146.htm>

Consulting Employees on Health and Safety. A Brief Guide to the Law INDG 232 (rev 2), HSE Books, 2013, ISBN 978 0 7176 6312 5. <http://www.hse.gov.uk/pubns/indg232.pdf>

Involving Your Workforce in Health and Safety: Good Practice for All Workplaces HSG263, HSE Books, 2008, ISBN 978 0 7176 6227 2. <http://www.hse.gov.uk/pubns/books/hsg263.htm>

Involving Your Workers in Health and Safety: A Guide for Small Businesses. Available on HSE's website www.hse.gov.uk/pubns/web35.pdf

15.11 Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2004 Amendment

15.11.1 Introduction

The 2002 COSHH Regulations have updated the 1999 Regulations with a few changes which include: additional definitions like 'inhalable dust' and 'health surveillance'; clarify and extend the steps required under risk assessment; introduce a duty to deal with accidents and emergencies.

In 2004, the Amendment Regulations were passed, but they were not enforced until 2005. The 2004 Amendment Regulations replace Regulation 7(7) and (8) by substituting new requirements to observe principles of good practice for the control of exposure to substances hazardous to health introduced by Schedule 2A, to ensure that workplace exposure limits are not exceeded, and to ensure in respect of carcinogens and asthmagens that exposure is reduced to as low a level as is reasonably practicable. They also introduce a single new Workplace Exposure Limit for substances hazardous to health which replaces occupational

exposure standards and maximum exposure limits. The amendment regulations introduce a duty to review control measures other than the provision of plant and equipment, including systems of work and supervision, at suitable intervals.

A revised 6th edition of the ACoP was issued in late 2013. The key changes are:

- ▶ revision of the text to make it easier for duty-holders to understand and comply with their legal duties;
- ▶ revision of the text to take account of the introduction of the Classification, Labelling and Packaging Regulation (CLP);
- ▶ moving information on the principles of good control practice from an annex to the guidance associated with Regulation 7;
- ▶ clarification of the requirements of Regulation 9, relating to thorough examination and test of control measures.

COSHH covers most substances hazardous to health found in workplaces of all types. The substances covered by COSHH include:

- ▶ substances used directly in work activities (e.g. solvents, paints, adhesives and cleaners);
- ▶ substances generated during processes or work activities (e.g. dust from sanding and fumes from welding);
- ▶ naturally occurring substances (e.g. grain dust).

But COSHH does **not** include:

- ▶ asbestos and lead, which have specific regulations;
- ▶ substances which are hazardous only because they:
 - ▷ are radioactive;
 - ▷ are simple asphyxiants;
 - ▷ are at high pressure;
 - ▷ are at extreme temperatures;
 - ▷ have explosive or flammable properties (separate Dangerous Substances and Explosive Atmospheres Regulations, DSEAR, cover these);
 - ▷ are biological agents if they are not directly connected with work and are not in the employer's control, such as catching flu from a workmate.

15.11.2 Definition of substance hazardous to health – Regulation 2

The range of substances regarded as hazardous under COSHH are:

- ▶ substances including preparations (mixtures of two or more substances) which are listed in Table 3.2 of part 3 of Annex VI of the CLP Regulation and for which an indication of danger specified for the substance is very toxic, toxic, harmful, corrosive or irritant;
- ▶ substances with a workplace exposure limit as listed in EH40 published by the HSE;

- ▶ biological agents (bacteria and other microorganisms) if they are directly connected with the work;
- ▶ any kind of dust in a concentration specified in the regulations, that is
 - (i) 10 mg/m³, as a time-weighted average over an 8-hour period, of inhalable dust, or
 - (ii) 4 mg/m³, as a time-weighted average over an 8-hour period, of respirable dust,
- ▶ any other substance which has comparable hazard to people's health but which, for technical reasons, is not covered by CLP.

Workplace exposure limit for a substance hazardous to health means the exposure limit approved by the HSE for that substance in relation to the specified reference period when calculated by a method approved by the HSE, as contained in HSE publication 'EH/40 Workplace Exposure Limits 2005' as updated from time to time.

15.11.3 Duties under COSHH – Regulation 3

The duties placed on employers under these Regulations are extended to (except for health surveillance, monitoring and information and training) persons who may be on the premises but not employed whether they are at work or not, for example visitors and contractors (see Table 15.3).

Table 15.3 The employers' duties

Duty of employer relating to:	Duty for the protection of:		
	Employees	Other people on the premises	Other people likely to be affected by the work
Assessment (regulation 6)	Yes	SFAIRP	SFAIRP
Prevention/control of exposure (regulation 7)	Yes	SFAIRP	SFAIRP
Use of control measures and maintenance, examination and testing of control measures (regulations 8 and 9)	Yes	SFAIRP	SFAIRP
Monitoring exposure (regulation 10)	Yes, where required	SFAIRP	No
Health surveillance (regulation 11)	Yes, where appropriate	No	No
Information, training, etc. (regulation 12)	Yes	SFAIRP	No
Arrangements to deal with accidents and emergencies (regulation 13)	Yes	SFAIRP	No

Source: HSE ACoP 6th Edition.

15.11.4 General requirements

There are eight basic steps to comply with COSHH.

They are:

1. Assess the risks to health;
2. Decide what precautions are needed;
3. Prevent or adequately control exposure;
4. Ensure that control measures are used and maintained;
5. Monitor the exposure of employees to hazardous substances;
6. Carry out appropriate health surveillance where necessary;
7. Prepare plans and procedures to deal with accidents, incidents and emergencies;
8. Ensure employees are properly informed, trained and supervised.

15.11.5 Steps 1 and 2: assessment of health risk - Regulation 6

No work may be carried out where employees are liable to be exposed to substances hazardous to health unless:

- ▶ a suitable and sufficient risk assessment, including the steps needed to meet COSHH, has been made.

The assessment must be reviewed and changes made regularly and immediately if:

- ▶ it is suspected that it is no longer valid;
- ▶ there has been a significant change in the work to which it relates;
- ▶ the results of any monitoring carried out in accordance with Regulation 10 shows it to be necessary.

The assessment includes:

- ▶ the hazardous properties of the substance;
- ▶ information on health effects provided by the supplier, including information contained in any relevant safety data sheet;
- ▶ the level, type and duration of exposure;
- ▶ the circumstances of the work, including the amount of the substance involved;
- ▶ activities, such as maintenance, where there is the potential for a high level of exposure;
- ▶ any relevant workplace exposure limit or similar occupational exposure limit;
- ▶ the effect of preventative and control measures which have been or will be taken in accordance with regulation 7;
- ▶ the results of relevant health surveillance;
- ▶ the results of monitoring of exposure in accordance with regulation 10;
- ▶ in circumstances where the work will involve exposure to more than one substance hazardous to health, the risk presented by exposure to such substances in combination;
- ▶ the approved classification of any biological agent; and

- ▶ such additional information as the employer may need in order to complete the risk assessment.

Where five or more employees are employed, the significant findings must be recorded and the steps taken to comply with Regulation 7 (this includes any revisions).

15.11.6 Step 3: prevention or control of exposure - Regulation 7

Every employer must ensure that exposure to substances hazardous to health is either:

- ▶ prevented or, where this is not reasonably practicable;
- ▶ adequately controlled.

Preference must be given to substituting with a safer substance. Where it is not reasonably practicable to prevent exposure, protection measures must be adopted in the following order of priority:

- ▶ the design and use of appropriate work processes, systems and engineering controls and the provision and use of suitable work equipment;
- ▶ the control of exposure at source, including adequate ventilation systems and appropriate organisational measures;
- ▶ where adequate control of exposure cannot be achieved by other means, the additional provision of suitable PPE.

The measures must include:

- ▶ safe handling, storage and transport (plus waste);
- ▶ reducing to a minimum required for the work the number of employees exposed, the level and duration of exposure, and the quantity of substance present at the workplace;
- ▶ the control of the working environment including general ventilation;
- ▶ appropriate hygiene measures.

Control of exposure shall only be treated as adequate

- ▶ the principles of good practice as set out in Schedule 2A (see Figure 15.4) are applied;
- ▶ any workplace exposure limit approved for that substance is not exceeded;
- ▶ for a carcinogen (in Schedule 1 or with risk phrase R45, R46 or R49, likely to be Hazard Statements 340,350,351,360,361 under CLP Regulation) or sensitiser (Risk phrases R42 or R42/43, likely to be Hazard Statements 317,334 under CLP Regulation) or asthmagen (section C of the HSE publication on Asthmagens ISBN 0 7176 1465 4) exposure is reduced to as low a level as is reasonably practicable.

PPE must conform to the Personal Protective Equipment (EC Directive) Regulations 2002.

Additionally, respiratory protective equipment must:

- ▶ be suitable for the purpose;
- ▶ comply with the EC Directive Regulations; or

Principles of good practice for the control of exposure to substances hazardous to health (Schedule 2A)

- ▶ Design and operate processes and activities to minimize emission, release and spread of substances hazardous to health.
- ▶ Take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures.
- ▶ Control exposure by measures that are proportionate to the health risk.
- ▶ Choose the most effective and reliable control options which minimize the escape and spread of substances hazardous to health.
- ▶ Where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable PPE.
- ▶ Check and review regularly all elements of control measures for their continuing effectiveness.
- ▶ Inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures developed to minimize the risks.
- ▶ Ensure that the introduction of control measures does not increase the overall risk to health and safety.

Figure 15.4 Principles of good practice

- ▶ if there is no requirement imposed by these regulations, of a type that shall conform to a standard, approved by the HSE.

Where exposure to a carcinogen or biological agent is involved, additional precautions are laid down in Regulation 7.

15.11.7 Step 4: use, maintenance, examination and test of control measures – Regulations 8 and 9

Every employer must take all reasonable steps to:

- ▶ ensure that control measures, PPE or anything else provided under COSHH, are properly used or applied;
- ▶ carry out visual checks and observations at appropriate intervals;
- ▶ see that where more than one item of PPE is being worn, the different items are compatible with each other;
- ▶ supervise employees to ensure that the defined methods of work are being followed;
- ▶ monitor systems for the effectiveness of controls and prompt remedial action where necessary.

Employees must make full and proper use of control measures, PPE or anything else provided. Employees must also, as far as is reasonable:

- ▶ follow the defined methods of work;
- ▶ return items to accommodation and report defects immediately;
- ▶ remove any PPE, which could cause contamination before eating, drinking or smoking;
- ▶ maintain a high standard of personal hygiene, and make proper use of facilities provided for washing, showering or bathing and for eating and drinking.

Employers shall also:

- ▶ properly maintain and keep clean plant and equipment, other engineering controls and PPE;
- ▶ in the case of the provision of systems of work and supervision or similar, review at suitable intervals and revise as necessary;
- ▶ carry out thorough examination and tests on engineering controls:
 - ▷ in the case of local exhaust ventilation (LEV) at least once every 14 months (except those in Schedule 4 which covers blasting of castings – monthly; dry grinding, polishing or abrading of metal for more than 12 hours per week – 6 months; and jute manufacture – 6 months);
 - ▷ in any other case, at suitable intervals;
- ▶ carry out thorough examination and tests where appropriate (except on disposable items) on respiratory protective equipment at suitable intervals;
- ▶ keep a record of examination and tests for at least 5 years;
- ▶ check, properly store, repair/replace and safely dispose of contaminated PPE as necessary.

15.11.8 Step 5: monitoring exposure – Regulation 10

Employers must monitor exposure:

- ▶ where this is necessary to ensure maintenance of control measures or the protection of health;
- ▶ specifically for vinyl chloride monomer or chromium plating as required by Schedule 5; and
- ▶ keep a record of identifiable personal exposures for 40 years and any other exposures for 5 years.

15.11.9 Step 6: health surveillance – Regulation 11

Employers must ensure employees, where appropriate, who are exposed or liable to be exposed, are under health surveillance. It is considered appropriate when:

- ▶ an employee is exposed (if significant) to substances or processes in Schedule 6;
- ▶ an identifiable disease or adverse health effect may be related to the exposure, and there is a reasonable likelihood that disease may occur and there are valid disease indication or effect detection methods.

Records of health surveillance containing approved particulars must be kept for 40 years or offered to the HSE if trading ceases. If a person is exposed to a substance and/or process in Schedule 6, the health surveillance shall include medical surveillance by an employment medical adviser or appointed doctor at intervals not exceeding 12 months.

If a medical adviser certifies that a person should not be engaged in particular work they must not be permitted to carry out that work except under specified conditions. Health records must be available for the individual employee to see after reasonable notice.

Employees must present themselves, during working hours at the employer's expense, for appropriate health surveillance.

An employment medical adviser or appointed doctor has the power to inspect the workplace or look at records for the purpose of carrying out functions under COSHH.

15.11.10 Step 7: accidents and emergencies – Regulation 13

Prepare plans and procedures to deal with accidents, incidents and emergencies involving hazardous substances beyond the risks of day-to-day use. This involves:

- ▶ first-aid provision and safety drills;
- ▶ information on emergency arrangements and specific hazards;
- ▶ suitable warning and other communications to enable appropriate response;
- ▶ ensuring suitable PPE and other equipment is available;
- ▶ making sure that the procedure is put into practice in an incident.

15.11.11 Step 8: information, instruction and training – Regulation 12

Where employees are likely to be exposed to substances hazardous to health, employers must provide:

- ▶ information, instruction and training on the risks to health and the precautions which should be taken (this duty is extended to anyone who may be affected);
- ▶ information on any monitoring of exposure (particularly if there is a workplace exposure limit where the employee or their representative must be informed immediately);
- ▶ information on collective results of health surveillance (designed so that individuals cannot be identified).

15.11.12 Defence – Regulation 21

It is a defence under these regulations for a person to show that they have taken all reasonable precautions and exercised all due diligence to avoid the commission of an offence.

15.11.13 Further information

A Step by Step Guide to COSHH Assessment HSG97, HSE Books, 2004, ISBN 978 0 7176 2785 1. <http://www.hse.gov.uk/pubns/books/hsg97.htm>

Control of Substances Hazardous to Health Approved Code of Practice and Guidance L5 (sixth edition), 2013, ISBN 9780717665822 <http://www.hse.gov.uk/pubns/books/l5.htm>

Working with substances hazardous to health INDG136(rev5), 2012, HSE, ISBN 9780717664863 <http://www.hse.gov.uk/pubns/indg136.pdf>

COSHH Essentials guidance publications: <http://www.hse.gov.uk/pubns/guidance/index.htm>

COSHH HSE Micro website: <http://www.hse.gov.uk/coshh/index.htm>

EH40/2005 Workplace Exposure Limits, HSE Books, 2011, ISBN 978 0 7176 6446 7. <http://www.hse.gov.uk/pubns/books/eh40.htm>

Respiratory Protective Equipment at Work HSG53 (Fourth Edition), HSE Books, 2013, ISBN 978 0 7176 6454 2. <http://www.hse.gov.uk/pubns/books/hsg53.htm>

Read the label How to find out if chemicals are dangerous. INDG 352 (rev 1) HSE 2010, ISBN 9780 7176 6414 6, <http://www.hse.gov.uk/pubns/indg352.pdf>

The Control of Substances Hazardous to Health Regulations 2002, SI 2002, 2677, 2004 Amendment <http://www.legislation.gov.uk/uk/si/2002/2677/contents/made>

15.12 Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002

15.12.1 Introduction

DSEAR deals with the prevention of fires, explosions and similar energy-releasing events arising from dangerous substances.

In summary the DSEAR Regulations require employers and the self-employed to:

- ▶ carry out an assessment of the fire and explosion risks of any work activities involving dangerous substances;
- ▶ provide measures to eliminate, or reduce, so far as is practicable, the identified fire and explosion risks;
- ▶ apply measures, so far as is practicable, to control risks and to mitigate the detrimental effects of a fire or explosion;
- ▶ provide equipment and procedures to deal with accidents and emergencies;
- ▶ provide employees with information and precautionary training.

Where explosive atmospheres may occur:

- ▶ the workplaces should be classified into hazardous and non-hazardous places, and any hazardous places

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classified into zones on the basis of the frequency and duration of an explosive atmosphere, and where necessary marked with a sign;

- ▶ the equipment in classified zones should be safe so as to satisfy the requirements of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996;
- ▶ the workplaces should be verified by a competent person, as meeting the requirements of DSEAR.

The revised ACoP (August 2013) consolidates the contents of five existing ACoPs into a single new ACoP as proposed by the first consultation. As a consequence, the following four ACoPs have been withdrawn, L134(Design), L135(Storage), L136(Control) and L137 (Maintenance).

Their contents have been consolidated into a revised and updated version of ACoP L138 – Dangerous Substances and Explosive Atmospheres Regulations 2002.

Changes in this edition include:

- ▶ Some guidance has been assigned ACoP status and vice versa. For example, previously no ACoP material existed for regulations 7 and 10. However, these changes were introduced to provide clarification on how to comply and do not introduce any new requirements.
- ▶ Adjustments in light of European and other legislation introduced, amended or revoked after DSEAR came into force such as:
 - ▷ General fire safety legislation
 - ▷ Classification for labelling and packaging
- ▶ Clarification on the scope of the regulations in relation to incompatible substances being outside the scope of DSEAR but within the scope of the Health and Safety at Work Act (HSWA).

5.12.2 Scope of regulations

Dangerous substance

The Regulations give a detailed interpretation of dangerous substance, which should be consulted. In summary it means:

- ▶ a substance or preparation that because of its chemical and sometimes physical properties and the way it is present and/or used at work, creates a fire or explosion risk to people; for example, substances like petrol, LPG, paints, cleaners, solvents and flammable gases;
- ▶ any dusts which could form an explosive mixture in air (not included in a substance or preparation), for example, many dusts from grinding, milling or sanding.

Explosive atmosphere

The Regulations give the definition as:

A mixture under atmospheric conditions, of air and one or more dangerous substances in the form

of gases, vapours, mists or dusts, in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

15.12.3 Application

The Regulations do not in general apply to:

- ▶ ships under the control of a master (DSEAR does apply when 'shoreside' workers and the ship's crew work together in a British port);
- ▶ areas used for medical treatment of patients;
- ▶ many gas appliances used for cooking, heating, hot water, refrigeration, etc. (except an appliance specifically designed for an industrial process), gas fittings;
- ▶ manufacture, use, transport of explosives or chemically unstable substances;
- ▶ mine, quarry or borehole activities;
- ▶ activity at an offshore installation;
- ▶ the use of means of transport (but the Regulations do cover means of transport intended for use in a potentially explosive atmosphere).

15.12.4 Risk assessment – Regulation 5

The risk assessment required by Regulation 5 must include:

- ▶ the hazardous properties of the dangerous substance;
- ▶ supplier information and safety data sheet;
- ▶ the circumstances of the work including:
 - ▷ work processes and substances used and their possible interactions;
 - ▷ the amount of substance involved;
 - ▷ risks of substances in combination;
 - ▷ arrangements for safe handling, storage and transport and any waste which might contain dangerous substances;
- ▶ high risk maintenance activities;
- ▶ likelihood of an explosive atmosphere;
- ▶ likelihood of ignition sources, including electrostatic discharges, being present;
- ▶ scale of any possible fire or explosion;
- ▶ any places connected by openings to areas where there could be an explosive atmosphere;
- ▶ any additional information which may be needed.

The risk assessment should be reviewed regularly.

15.12.5 Elimination or reduction of risks – Regulation 6

Regulation 6 concerns the reduction of risks and tracks the normal hierarchy as follows:

- ▶ Substitute a dangerous substance by a substance or process which eliminates or reduces the risk, for example the use of water-based paints, or using a totally enclosed continuous process.

- ▶ Reduce the quantity of dangerous substance to a minimum; for example, only a half-day supply in the workroom.
- ▶ Avoid releasing of a dangerous substance or minimise releases, for example keeping them in special closed containers.
- ▶ Control releases at source.
- ▶ Prevent the formation of explosive atmospheres, including the provision of sufficient ventilation.
- ▶ Ensure that any releases are suitably collected, contained and removed; suitable LEV in a paint spray booth is an example.
- ▶ Avoid ignition sources and adverse conditions, for example keep electrical equipment outside the area.
- ▶ Segregate incompatible dangerous substances, for example oxidising substances and other flammable substances.

Steps must also be taken to mitigate the detrimental effects of a fire or explosion by:

- ▶ keeping the number of people exposed to a minimum;
- ▶ avoidance of fire and explosion propagation;
- ▶ provision of explosion relief systems;
- ▶ provision of explosion suppression equipment;
- ▶ provision of very strong plant which can withstand an explosion;
- ▶ the provision of suitable PPE.

15.12.6 Classification of workplaces – Regulation 7 and Schedule 2

Where an explosive atmosphere may occur, workplaces must be classified into hazardous and non-hazardous places. Table 15.4 shows the zones specified by Schedule 2 of the Regulations.

Table 15.4 Classification zones

Classification zones	
Zone 0	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods.
Zone 1	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operations occasionally.
Zone 2	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operations but, if it does, will persist for a short period only.
Zone 20	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods.
Zone 21	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operations occasionally.
Zone 22	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operations but, if it does occur, will persist for a short period only.



Figure 15.5 Warning sign for places where explosive atmospheres may occur

15.12.7 Accidents, incidents and emergencies – Regulation 8

In addition to any normal fire prevention requirements employers must under these Regulations:

- ▶ ensure that procedures and first-aid are in place with tested relevant safety drills;
- ▶ provide information on emergency arrangements including work hazards and those that are likely to arise at the time of an accident;
- ▶ provide suitable warning and other communications systems to enable an appropriate response, remedial actions and rescue operations to be made;
- ▶ where necessary, before any explosion condition is reached, provide visual or audible warnings and withdraw employees;
- ▶ provide escape facilities where the risk assessment indicates it is necessary.

In the event of an accident, immediate steps must be taken to:

- ▶ mitigate the effects of the event;
- ▶ restore the situation to normal;
- ▶ inform employees who may be affected.

Only essential persons may be permitted in the affected area. They must be provided with PPE, protective clothing and any necessary specialised safety equipment and plant.

15.12.8 Information, instruction and training – Regulation 9

Under Regulation 9 where a dangerous substance is present, an employer must provide:

- ▶ suitable and sufficient information, instruction and training on the appropriate precautions and actions;
- ▶ details of the substances, any relevant data sheets and legal provisions;
- ▶ the significant findings of the risk assessment.

15.12.9 Contents of containers and pipes – Regulation 10

Regulation 10 requires that for containers and pipes (except where they are marked under legislation contained in Schedule 5 to the Regulations) the content and the nature of those contents and any associated hazards be clearly identified.

15.12.10 Further information

The Dangerous Substances and Explosive Atmosphere Regulations 2002, SI 2002, No. 2776, ISBN 9780 11 042957 5.

Dangerous Substances and Explosive Atmospheres, L138 (Second edition). Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice, 2013, HSE Books, ISBN 978 0 7176 2203 2. <http://www.hse.gov.uk/pubns/priced/l138.pdf>

Fire and Explosions – How Safe is Your Workshop. A Short Guide to DSEAR, HSE INDG370(rev1), 2013, HSE Books, www.hse.gov.uk/pubns/indg370.htm

Safe Handling of Combustible Dusts; Precautions Against Explosion HSG 103, HSE Books, 2003, ISBN 978 0 7176 2726 4 <http://www.hse.gov.uk/pubns/books/hsg103.htm>

Safe Use and Handling of Flammable Liquids HSG 140, HSE Books, 1996, ISBN 978 0 7176 0967 3. <http://www.hse.gov.uk/pubns/books/hsg140.htm>

Safe Working with Flammable Substances INDG227 HSE Books, 2011, ISBN 978 0 7176 1154 6. www.hse.gov.uk/pubns/indg227.pdf

5.13 Health and Safety (Display Screen Equipment) Regulations 1992 as amended in 2002

15.13.1 General

These Regulations cover the minimum health and safety requirements for the use of display screen equipment (DSE) and are accompanied by a guidance note. They typically apply to computer equipment with either a cathode ray tube or liquid crystal monitors. But any type of display is covered with some exceptions, for example on board a means of transport, or where the main purpose is for screening a film or for a television. Multimedia equipment would generally be covered

Equipment not specifically covered by these Regulations or where it is not being used by a defined 'user' is, nevertheless, covered by other requirements under the MHSWR and the Provision and Use of Work Equipment Regulations (PUWER).

15.13.2 Definitions – Regulation 1

- (a) Display Screen Equipment (DSE) refers to any alphanumeric or graphic display screen, regardless of the display process involved.

- (b) A user is an employee and an operator is a self-employed person, both of whom habitually use DSE as a significant part of their normal work. Both would be people to whom most or all of the following apply. A person:
- ▶ who depends on the DSE to do their job;
 - ▶ who has no discretion as to use or non-use;
 - ▶ who needs particular training and/or skills in the use of DSE to do their job;
 - ▶ who uses DSE for continuous spell of an hour or more at a time;
 - ▶ who does so on a more or less daily basis;
 - ▶ for whom fast transfer of data is important for the job;
 - ▶ of whom a high level of attention and concentration is required, in particular to prevent critical errors.
- (c) A workstation is an assembly comprising:
- ▶ DSE with or without a keyboard, software or input device;
 - ▶ optional accessories;
 - ▶ disk drive, telephone, modem, printer, document holder, chair, desk, work surface, etc.;
 - ▶ the immediate working environment.

15.13.3 Exemptions – Regulation 1(4)

Exemptions include DSE used in connection with:

- ▶ drivers' cabs or control cabs for vehicles or machinery;
- ▶ on board a means of transport;
- ▶ mainly intended for public operation;
- ▶ portable systems not in prolonged use;
- ▶ calculators, cash registers and small displays related to the direct use of this type of equipment;
- ▶ window typewriters.

15.13.4 Assessment of risk – Regulation 2

Possible hazards associated with DSE are physical (musculoskeletal) problems, visual fatigue and mental stress. They are not unique to display screen work, nor an inevitable consequence of it, and indeed research shows that the risk to the individual from typical display screen work is low. However, as in other types of work, ill-health can result from poor work organisation, working environment, job design and posture, and from inappropriate working methods.

Employers must carry out a suitable and sufficient analysis of users' (regardless of who has provided them) and operators' (provided by the employer) workstations in order to assess the risks to health and safety. The guidance gives detailed information on workstation minimum standards and possible effects on health.

The assessment should be reviewed when major changes are made to software, hardware, furniture, environment or work requirements.

15.13.5 Workstations – Regulation 3

All workstations must meet the requirements laid down in the schedule to the Regulations. This schedule lays down minimum requirements for display screen workstations, covering the equipment, the working environment and the interface between computer and user/operator.

15.13.6 Daily work routine of users – Regulation 4

The activities of users should be organised so that their daily work on DSE is periodically interrupted by breaks or changes of activity that reduce their workload at the equipment.

In most tasks, natural breaks or pauses occur from time to time during the day. If such breaks do not occur, deliberate breaks or pauses must be introduced. The guidance requires that breaks should be taken before the onset of fatigue and must be included in the working time. Short breaks are better than occasional long ones, for example a 5–10-minute break after 50 to 60 minutes continuous screen and/or keyboard work is likely to be better than a 15-minute break every 2 hours. If possible, breaks should be taken away from the screen. Informal breaks, with time on other tasks, appear to be more effective in relieving visual fatigue than formal rest breaks.

15.13.7 Eyes and eyesight – Regulation 5

Initially on request, employees have the right to a free eye and eyesight test conducted by a competent person where they are:

- ▶ already users (as soon as practicable after the request);
- ▶ to become a user (before they become a user).

The employer must provide a further eye and eyesight test at regular intervals thereafter or when a user is experiencing visual difficulties which could be caused by working with DSE.

There is no reliable evidence that work with DSE causes any permanent damage to eyes or eyesight, but it may make users with pre-existing vision defects more aware of them.

An eye and eyesight test means a sight test as defined in the Opticians Act 1989. This should be carried out by a registered ophthalmic optician or medical practitioner (normally only those with an ophthalmic qualification do so).

Employers shall provide special corrective appliances to users where:

- ▶ normal corrective appliances cannot be used;
- ▶ the result of the eye and eyesight test shows that such provision is necessary.

The guidance indicates that the liability of the employer extends only to the provision of corrective appliances which are of a style and quality adequate for their function. If an employee chooses a more expensive design or multi-function correction appliances, the employer need only pay a proportion of the cost.

Employers are free to specify that users' eye and eyesight tests and correction appliances are provided by a nominated company or optician.

The confidential clinical information from the tests can only be supplied to the employer with the employee's consent.

Vision screen tests can be used to identify people with defects but they are not a substitute for the full eyesight test, and employees have the right to opt for the full test from the outset.

15.13.8 Training – Regulation 6

Employers shall ensure that adequate health and safety training is provided to users and potential users in the use of any workstation and refresh the training following any reorganisation. The guidance suggests a range of topics to be covered in the training. In summary these involve:

- ▶ the recognition of hazards and risks, including the absence of desirable features and the presence of undesirable ones;
- ▶ causes of risk and how harm may occur;
- ▶ what the user can do to correct them;
- ▶ how problems can be communicated to management;
- ▶ information on the regulations;
- ▶ the user's contribution to assessments.

15.13.9 Information – Regulation 7

Operators and users shall be provided with adequate information on all aspects of health and safety relating to their workstation and what steps the employer has taken to comply with the Regulations (insofar as the action taken relates to that operator or user and their work). Under Regulation 7, specific information should be provided as outlined in 3.

15.13.10 Further information

Display screen equipment Workstation Checklist, 2013, HSE Books, ISBN 9780 7176 6521 1 <http://www.hse.gov.uk/pubns/ck1.htm>

Work with Display Screen Equipment, Health and Safety (Display Screen Equipment) Regulations 1992 as Amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002 – Guidance on Regulations L26 (second edition), 2003, HSE Books, ISBN 978 0 7176 2582 6. <http://www.hse.gov.uk/pubns/books/l26.htm>

Table 15.5 Provision of information under DSE regulation 7

		Information on					
		Risks from DSE workstation	Risk assessment and measures to reduce the risks Regs 2 and 3	Breaks and activity changes Reg. 4	Eye and eyesight tests Reg. 5	Initial training Reg. 6(1)	Training when workstation modified Reg. 6(2)
Does employer have to provide information to display screen workers who are:	Users employed by the undertaking	Yes	Yes	Yes	Yes	Yes	Yes
	Users employed by other employer	Yes	Yes	Yes	No	No	Yes
	Operators in the undertaking	Yes	Yes	No	No	No	No

Source: HSE.

Working with Display screen equipment (DSE) A brief guide, INDG36 (rev 4), 2013, HSE Books, ISBN 978 0 7176 6222 7. <http://www.hse.gov.uk/pubns/indg36.pdf>

15.14 Electricity at Work Regulations 1989

The purpose of these Regulations is to require precautions to be taken against the risk of death or personal injury from electricity in work activities. The Regulations impose duties on persons ('duty-holders') in respect of systems, electrical equipment and conductors and in respect of work activities on or near electrical equipment. They apply to almost all places of work and electrical systems at all voltages.

Guidance on the Regulations is contained in the Memorandum of Guidance on the Electricity at Work Regulations 1989, published by the HSE.

15.14.1 Definitions

- Electrical equipment** – includes anything used to generate, provide, transmit, rectify, convert, conduct, distribute, control, store, measure or use electrical energy.
- Conductor** – means a conductor of electrical energy. It means any material (solid, liquid or gas), capable of conducting electricity.
- System** – means an electrical system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, and includes the source and equipment. It includes portable generators and systems on vehicles.
- Circuit conductor** – term used in Regulations 8 and 9 only, means a conductor in a system which is intended to carry electric current in normal conditions. It would include a combined neutral and

earth conductor, but does not include a conductor provided solely to perform a protective connection to earth or other reference point and energised only during abnormal conditions.

- (e) **Danger** – in the context of these Regulations means a risk of injury from any electrical hazard.

Every year about 30 people die from electric shock or electric burns at work. Each year several hundred serious burns are caused by arcing where the heat generated can be very intense. In addition, intense ultraviolet radiation from an electric arc can cause damage to the eyes – known as arc-eye. These hazards are all included in the definition of **Danger**.

15.14.2 Duties – Regulation 3

Duties are imposed on employers, self-employed and employees. The particular duties on employees are intended to emphasise the level of responsibility which many employees in the electrical trades and professions are expected to take on as part of their job. Employees are:

- ▶ to cooperate with their employer so far as is necessary to enable any duty placed on the employer to be complied with (this reiterates Section 7(b) of the HSW Act);
- ▶ to comply with the provisions of these Regulations insofar as they relate to matters which are within their control. (This is equivalent to duties placed on employers and self-employed where these matters are within their control.)

15.14.3 Systems, work activities and protective equipment – Regulation 4

Systems must, at all times, be of such construction as to prevent danger. Construction covers the physical

condition, arrangement of components and design of the system and equipment.

All systems must be maintained so as to prevent danger.

Every work activity, including operation, use and maintenance or work near a system, shall be carried out in a way which prevents danger.

Protective equipment shall be suitable, suitably maintained and used properly.

15.14.4 Strength and capability of equipment – Regulation 5

No electrical equipment may be put into use where its strength and capability may be exceeded in such a way as may give rise to danger, in normal transient or fault conditions.

15.14.5 Adverse or hazardous environments – Regulation 6

Electrical equipment which may be exposed to:

- ▶ mechanical damage;
- ▶ the effects of weather, natural hazards, temperature or pressure;
- ▶ the effects of wet, dirty, dusty or corrosive conditions;
- ▶ any flammable or explosive substances including dusts, vapours or gases;

shall be so constructed and protected that it prevents danger.

15.14.6 Insulation, protection and placing of conductors – Regulation 7

All conductors in a system which may give rise to danger shall either be suitably covered with insulating material and further protected as necessary, for example against mechanical damage, using trunking or sheathing; or have precautions taken that will prevent danger, for example being suitably placed like overhead electric power cables, or by having strictly controlled working practices.

15.14.7 Earthing, integrity and other suitable precautions – Regulations 8 and 9

Precautions shall be taken, either by earthing or by other suitable means, for example double insulation, use of safe voltages and earth-free non-conducting environments, where a conductor, other than a circuit conductor, could become charged as a result of either the use of, or a fault in, a system.

An earth conductor shall be of sufficient strength and capability to discharge electrical energy to earth. The conductive part of equipment, which is not normally live but energised in a fault condition, could be a conductor.

If a circuit conductor is connected to earth or to any other reference point nothing which could break electrical continuity or introduce high impedance, for example fuse, thyristor or transistor, is allowed in the conductor unless suitable precautions are taken. Permitted devices would include a joint or bolted link, but not a removable link or manually operated knife switch without bonding of all exposed metal work and multiple earthing.

15.14.8 Connections – Regulation 10

Every joint and connection in a system shall be mechanically and electrically suitable for its use. This includes terminals, plugs and sockets.

15.14.9 Excess current protection – Regulation 11

Every part of a system shall be protected from excess current, for example short circuit or overload, by a suitably located efficient means such as a fuse or circuit breaker.

15.14.10 Cutting off supply and isolation – Regulation 12

There should be suitably located and identified means of cutting off (switch) the supply of electricity to any electrical equipment and also isolating any electrical equipment. Although these are separate requirements, they could be affected by a single means. The isolator should be capable of being locked off to allow maintenance to be done safely.

Sources of electrical energy (accumulators, capacitors and generators) are exempt from this requirement, but precautions must be taken to prevent danger.

15.14.11 Work on equipment made dead – Regulation 13

Adequate precautions shall be taken to prevent electrical equipment that has been made dead from becoming live while work is carried out on or near the equipment. This will include means of locking off isolators, tagging equipment, permits to work and removing fuses.

15.14.12 Work on or near live conductors – Regulation 14

No persons shall work near a live conductor, except if it is insulated, unless:

- ▶ it is unreasonable in all the circumstances for it to be dead;
- ▶ it is reasonable in **all** the circumstances for them to be at work on or near it while it is live;
- ▶ suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

15

15.14.13 Working space access and lighting – Regulation 15

Adequate working space means of access and lighting shall be provided for all electrical equipment at which or near which work is being done in circumstances which may give rise to danger. This covers work of any kind. However, when the work is on live conductors, the access space must be sufficient for a person to fall back out of danger and if needed for persons to pass one another with ease and without hazard.

15.14.14 Competence – Regulation 16

Where technical knowledge or experience is necessary to prevent danger, all persons must possess such knowledge or experience or be under appropriate supervision.

15.14.15 Further information

Electrical Safety and You INDG231(rev1), 2012, HSE Books <http://www.hse.gov.uk/pubns/indg231.pdf>

Electrical Switch Gear and Safety. A Concise Guide for Users INDG372(rev1), HSE Books, 2013, <http://www.hse.gov.uk/pubns/indg372.pdf>

Electricity at Work: Safe Working Practices HSG85, 2013 (third edition), HSE Books, ISBN 978 0 7176 6581 5. www.hse.gov.uk/pubns/books/hsg85.htm

Guidance on Safe Isolation Procedures, SELECT, <http://www.select.org.uk> ISBN 978 0 7176 1272 4.

Maintaining Portable and Transportable Electrical Equipment HSG107 (third edition), 2013, HSE Books, ISBN 978 0 7176 6606 5. <http://www.hse.gov.uk/pubns/books/hsg107.htm>

Maintaining Portable Electrical Equipment in Low-risk Environments INDG236(rev 3), 2013, HSE Books, <http://www.hse.gov.uk/pubns/indg236.pdf>

Memorandum of Guidance on the Electricity at Work Regulations, Guidance on Regulations HSR25, 2007, HSE Books, ISBN 978 0 7176 6228 9. <http://www.hse.gov.uk/pubns/books/hsr25.htm>

Safety in Electrical Testing at Work, General Guidance INDG354(rev1), 2013, HSE Books, <http://www.hse.gov.uk/pubns/indg354.pdf>

Avoidance of danger from overhead power-lines GS6 (Fourth Edition), 2013, <http://www.hse.gov.uk/pubns/gsg6.htm>

15.15 Employers' Liability (Compulsory Insurance) Act 1969 and Regulations 1998 amended in 2002, 2004 and 2008

15.15.1 Introduction

Employers are responsible for the health and safety of employees while they are at work. Employees may

be injured at work, or they or former employees may become ill as a result of their work while employed. They may try to claim compensation from the employer if they believe them to be responsible. The Employers' Liability Compulsory Insurance Act 1969 ensures that an employer has at least a minimum level of insurance cover against any such claims.

Employers' liability insurance will enable employers to meet the cost of compensation for employees' injuries or illnesses whether they are caused on or off site. However, any injuries or illnesses relating to motor accidents that occur while employees are working for them may be covered separately by motor insurance.

Public liability insurance is different. It covers for claims made against a person/company by members of the public or other businesses, but not for claims made by employees. While public liability insurance is generally voluntary, employers' liability insurance is compulsory. Employers can be fined if they do not hold a current employers' liability insurance policy which complies with the law.

Employers must use an authorised insurer working under the terms of the Financial Services and Markets Act 2000. The Financial Conduct Authority (FCA; formerly Financial Services Authority (FSA)) keeps a list of authorised insurance companies in the Financial Services Register, see www.fca.org.uk.

15.15.2 Application

An employer needs employers' liability insurance unless they are exempt from the Employers' Liability Compulsory Insurance Act. The following employers are exempt:

- ▶ most public organisations including government departments and agencies, LAs, police authorities and nationalised industries;
- ▶ health service bodies, including National Health Service trusts, health authorities, Family Health Services Authorities and Scottish Health Boards and State Hospital Management Committees;
- ▶ some other organisations which are financed through public funds, such as passenger transport executives and magistrates' courts committees;
- ▶ family businesses, i.e. if employees are closely related to the employer (as husband, wife, father, mother, grandfather, grandmother, stepfather, stepmother, son, daughter, grandson, granddaughter, stepson, stepdaughter, brother, sister, half-brother or half-sister). However, this exemption does not apply to family businesses that are incorporated as limited companies except any employer which is a company that has only one employee who owns 50% or more of the share capital.

A full list of employers who are exempt from the need to have employers' liability insurance is shown

at Schedule 2 of the Employers' Liability (Compulsory Insurance) Regulations 1998.

15.15.3 Coverage

Employers are only required by law to have employers' liability insurance for people whom they employ under a contract of service or apprenticeship. However, people who are normally thought of as self-employed may be considered to be employees for the purposes of employers' liability insurance.

Whether or not an employer needs employers' liability insurance for someone who works for them depends on the terms of the contract. This contract can be spoken, written or implied. It does not matter whether someone is usually called an employee or self-employed or what their tax status is. Whether the contract is called a contract of employment or a contract for services is largely irrelevant. What matters is the real nature of the employer/employee relationship and the degree of control the employer has over the work employees do.

There are no hard and fast rules about who counts as employee for the purposes of employers' liability insurance. The following paragraphs may help to give some indication.

In general, employers' liability insurance may be needed for a worker if:

- ▶ national insurance and income tax is deducted from the money paid to them;
- ▶ the employer has the right to control where and when they work and how they do it;
- ▶ most materials and equipment are supplied by the employer;
- ▶ the employer has a right to any profit workers make even though the employer may choose to share this with them through commission, performance pay or shares in the company; similarly, the employer will be responsible for any losses;
- ▶ that person is required to deliver the service personally and they cannot employ a substitute if they are unable to do the work;
- ▶ they are treated in the same way as other employees, for example if they do the same work under the same conditions as some other employee.

In some cases you will not need additional employers' liability insurance for volunteers or for:

- ▶ students who work unpaid;
- ▶ people who are not employed but are taking part in youth or adult training programmes;
- ▶ school children on work experience programmes.

In practice, insurance companies usually provide cover for people in these situations.

One difficult area is domestic help. In general, an employer will probably not need employers' liability insurance for people such as cleaners or gardeners if they work for more than one person. However, if

they only work for one employer, that employer may be required to take out insurance to protect them.

15.15.4 Display of certificate

Under the Regulations, employers must display, in a suitable convenient location, a current copy of the certificate of insurance at each place of business where they employ relevant people. This can be done electronically as long as employees know how to access the information and have access to computers.

15.15.5 Retention of certificates

Since 1 October 2008 there has been no legal requirement for employers to keep copies of out-of-date certificates.

However, employers are strongly advised to keep, as far as is possible, a complete record of their employers' liability insurance. This is because some diseases can appear decades after exposure to their cause and former or current employees may decide to make a claim against their employer for the period they were exposed to the cause of their illness.

Employers that fail to hold the necessary insurance details risk having to meet the costs of such claims themselves.

15.15.6 Penalties

The HSE enforces the law on employers' liability insurance and HSE inspectors will check that employers have employers' liability insurance with an approved insurer for at least £5 million. They will ask to see the certificate of insurance and other insurance details.

Employers can be fined up to £2,500 for any day they are without suitable insurance. If they do not display the certificate of insurance or refuse to make it available to HSE inspectors when they ask, employers can be fined up to £1,000.

15.15.7 Further information

Employers' Liability (Compulsory Insurance) Act 1969:
A Guide for Employers HSE40 (rev 4), 2012, ISBN
9780717664801, HSE website: <http://www.hse.gov.uk/pubns/hse40.htm>

15.16 Regulatory Reform (Fire Safety) Order 2005

15.16.1 Introduction

This Order, made under the Regulatory Reform Act 2001, reforms the law relating to fire safety in non-domestic premises. It replaces fire certification under the Fire Precautions Act 1971 (which it repeals) with a general duty to ensure, so far as is practicable, the safety of employees,

a general duty, in relation to non-employees, to take such fire precautions as may reasonably be required in the circumstances to ensure that premises are safe and a duty to carry out a risk assessment.

The Fire Safety Order is the responsibility of the Department for Communities and Local Government and is enforced by the local fire and rescue authorities, with some exceptions which include:

- ▶ the HSE for:
 - (i) nuclear installations;
 - (ii) ships in construction or repair;
 - (iii) construction sites other than a construction site which is contained within, or forms part of, premises which are occupied by persons other than those carrying out the construction work or any activity arising from such work.
- ▶ in Crown-occupied and Crown-owned buildings, enforcement is carried out by the Fire Services Inspectorates appointed under the Fire Services Act 1947.
- ▶ LAs for Certificated Sports Grounds.

The order came into force on 1 October 2006 with a number of guidance documents.

In Scotland the fire safety legislation is enacted through the Fire (Scotland) Act 2005 which received Royal Assent on 1 April 2005 as amended by the Police and Fire Reform (Scotland) Act 2012. Also see 15.16.19 for more detail.

Parts 1, 2, 4 and 5 of the Act commenced in August 2005. Part 3 introduced a new fire safety regime for non-domestic premises and came into force on 1 October 2006 and replaced the Fire Precautions Act 1971 and the Fire Precautions (Workplace) Regulations 1997, as amended. Fire certificates were no longer required after 1 October 2006 and the new fire safety regime based on the principle of risk assessment.

Ten guidance documents to complement the legislation and help those with fire safety responsibilities to understand their duties are available.

Part 1 General

15.16.2 Interpretation – Articles 1-7

Here are a few of the more important definitions from the articles. For a full list consult the Order directly.

- (a) 'Premises' includes any place and, in particular, includes:
- ▶ any workplace;
 - ▶ any vehicle, vessel, aircraft or hovercraft;
 - ▶ any installation on land (including the foreshore and other land intermittently covered by water), and any other installation (whether floating, or resting on the seabed or the subsoil thereof, or resting on other land covered with water or the subsoil thereof);
 - ▶ any tent or movable structure.

(b) 'Risk' means the risks to the safety of persons from fire. 'Safety' means the safety of persons in the event of fire. 'Workplace' means any premises or parts of premises, not being domestic premises, used for the purposes of an employer's undertaking and which are made available to an employee of the employer as a place of work and includes:

- ▶ any place within the premises to which such employee has access while at work;
- ▶ any room, lobby, corridor, staircase, road or other place;
- ▶ used as a means of access to or egress from that place of work; or
- ▶ where facilities are provided for use in connection with that place of work, other than a public road.

(c) 'Responsible person' means:

- ▶ in relation to a workplace, the employer, if the workplace is to any extent under their control;
- ▶ in relation to any premises not falling within paragraph (a):
 - ▶ the person who has control of the premises (as occupier or otherwise) in connection with the carrying on by them of a trade, business or other undertaking (for profit or not), or
 - ▶ the owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business or other undertaking.

(d) 'General fire precautions' in relation to premises means:

- ▶ measures to reduce the risk of fire and the risk of the spread of fire;
- ▶ the means of escape from the premises;
- ▶ measures for securing that, at all material times, the means of escape can be safely and effectively used;
- ▶ measures in relation to fighting fires;
- ▶ the means for detecting fires and giving warning in case of fire;
- ▶ action to be taken in the event of fire, including instruction and training of employees;
- ▶ measures to mitigate the effects of the fire.

These issues do not cover process-related fire risks including:

- ▶ the use of plant or machinery, or
- ▶ the use or storage of any dangerous substance.

Duties are placed on responsible persons in a workplace and in premises which are not workplaces to the extent that they have control over the premises. The order does not apply (Article 8) to:

- ▶ domestic premises;
- ▶ an offshore installation;
- ▶ a ship, in respect of the normal ship-board activities of a ship's crew which are carried out solely by the crew under the direction of the master;

- ▶ fields, woods or other land forming part of an agricultural or forestry undertaking but which is not inside a building and is situated away from the undertaking's main buildings;
- ▶ an aircraft, locomotive or rolling stock, trailer or semi-trailer used as a means of transport or a vehicle;
- ▶ a mine other than any building on the surface at a mine;
- ▶ a borehole site.

In addition certain provisions of the Order do not apply to groups of workers such as:

- ▶ occasional work which is not harmful to young people in a family undertaking;
- ▶ armed forces;
- ▶ members of police forces;
- ▶ emergency services.

Part 2 Fire Safety Duties

15.16.3 Duty to take general fire precautions – Article 8

The responsible person must:

- (a) take such general fire precautions as will ensure, so far as is practicable, the safety of any of his employees; and
- (b) in relation to relevant persons who are not his employees, take such general fire precautions as may reasonably be required in the circumstances of the case to ensure that the premises are safe.

15.16.4 Risk assessment and fire safety arrangements – Articles 9 and 11

The responsible person must make a suitable and sufficient assessment of the risks to identify the general fire precautions he/she needs to take.

Where a dangerous substance is or is liable to be present in or on the premises, the risk assessment must include consideration of the matters set out in Part 1 of Schedule 1, reproduced in Figure 15.6 (a).

Risk assessments must be reviewed by the responsible person regularly and if it is no longer valid or there have been significant changes. The responsible person must not employ a young person unless risks to young persons have been considered in an assessment covering the following, which is Part 2 of Schedule 1, reproduced in Figure 15.6 (b).

The responsible person must make and record (as per risk assessments) arrangements as are appropriate, for the effective planning, organisation, control, monitoring and review of the preventative and protective measures.

MATTERS TO BE CONSIDERED IN RISK ASSESSMENT IN RESPECT OF DANGEROUS SUBSTANCES

PART 1 OF SCHEDULE 1

The matters are:

- (a) the hazardous properties of the substance
- (b) information on safety provided by the supplier, including information contained in any relevant safety data sheet
- (c) the circumstances of the work including:
 - (i) the special, technical and organizational measures and the substances used and their possible interactions
 - (ii) the amount of the substance involved
 - (iii) where the work will involve more than one dangerous substance, the risk presented by such substances in combination
 - (iv) the arrangements for the safe handling, storage and transport of dangerous substances and of waste containing dangerous substances.
- (d) activities, such as maintenance, where there is the potential for a high level of risk
- (e) the effect of measures which have been or will be taken pursuant to this Order
- (f) the likelihood that an explosive atmosphere will occur and its persistence
- (g) the likelihood that ignition sources, including electrostatic discharges, will be present and become active and effective
- (h) the scale of the anticipated effects
- (i) any places which are, or can be connected via openings to, places in which explosive atmospheres may occur
- (j) such additional safety information as the responsible person may need in order to complete the assessment.

Matters to be taken into particular account in risk assessment in respect of young persons

The matters are:

- (a) The inexperience, lack of awareness of risks and immaturity of young persons;
- (b) The fitting-out and layout of the premises;
- (c) The nature, degree and duration of exposure to physical and chemical agents;
- (d) The form, range and use of work equipment and the way in which it is handled;
- (e) The organization of processes and activities;
- (f) The extent of the safety training provided or to be provided to young persons;
- (g) Risks from agents, processes and work listed in the Annex to Council Directive 94/33/EC(a) on the protection of young people at work.

Figure 15.6 Fire safety order: (a) matters to be considered in dangerous substances; (b) in respect of young persons

15.16.5 Principles of prevention to be applied and fire safety arrangements – Articles 10 and 11

Preventative and protective measures must be implemented on the basis of the principles specified in Part 3 of Schedule 1 as follows, which are broadly the same as those in the Management Regulations.

Principles of prevention

The principles are:

- (a) avoiding risks;

- (b) evaluating the risks which cannot be avoided;
- (c) combating the risks at source;
- (d) adapting to technical progress;
- (e) replacing the dangerous substances by the non-dangerous or the less-dangerous substances;
- (f) developing a coherent overall prevention policy which covers technology, organisation of work and the influence of factors relating to the working environment;
- (g) giving collective protective measures priority over individual protective measures;
- (h) giving appropriate instructions to employees.

Fire safety arrangements must be made and put into effect by the responsible person where five or more people are employed; there is a licence for the premises; or an Alterations Notice requires them to be recorded. The arrangements must cover effective planning, organisation, control, monitoring and review of the preventative and protective measures.

15.16.6 Elimination or reduction of risks from dangerous substances – Article 12

Where a dangerous substance is present in or on the premises, the responsible person must ensure that risk of the substance is either eliminated or reduced, so far as practicable, by first replacing the dangerous substance with a safer alternative.

Where it is not reasonably practicable to eliminate risk the responsible person must, so far as practicable, apply measures including the measures specified in Part 4 of Schedule 1 to the Order (Figure 15.7).

The responsible person must:

- (a) arrange for the safe handling, storage and transport of dangerous substances and waste containing dangerous substances;
- (b) ensure that any conditions necessary for ensuring the elimination or reduction of risk are maintained.

15.16.7 Fire-fighting and fire detection – Article 13

The premises must be equipped with appropriate fire-fighting equipment and with fire detectors and alarms; any non-automatic fire-fighting equipment provided must be easily accessible, simple to use and indicated by signs.

Appropriate measures must be taken for fire-fighting in the premises: to nominate and train competent persons to implement the measures; and arrange any necessary contacts with external emergency services.

A person is to be regarded as competent where they have sufficient training and experience or knowledge and other qualities to enable them to properly implement the measures referred to.

Measures to be taken in respect of dangerous substances

1. In applying measures to control risks the responsible person must, in order of priority:
 - (a) reduce the quantity of dangerous substances to a minimum
 - (b) avoid or minimize the release of a dangerous substance
 - (c) control the release of a dangerous substance at source
 - (d) prevent the formation of an explosive atmosphere, including the application of appropriate ventilation
 - (e) ensure that any release of a dangerous substance which may give rise to risk is suitably collected, safely contained, removed to a safe place, or otherwise rendered safe, as appropriate
 - (f) avoid:
 - (i) ignition sources including electrostatic discharges
 - (ii) such other adverse conditions as could result in harmful physical effects from a dangerous substance
 - (g) segregate incompatible dangerous substances.
2. The responsible person must ensure that mitigation measures applied in accordance with Article 12(3)(b) include:
 - (a) reducing to a minimum the number of persons exposed
 - (b) measures to avoid the propagation of fires or explosions
 - (c) providing explosion pressure relief arrangements
 - (d) providing explosion suppression equipment
 - (e) providing plant which is constructed so as to withstand the pressure likely to be produced by an explosion
 - (f) providing suitable personal protective equipment.
3. The responsible person must:
 - (a) ensure that the premises are designed, constructed and maintained so as to reduce risk
 - (b) ensure that suitable special, technical and organisational measures are designed, constructed, assembled, installed, provided and used so as to reduce risk
 - (c) ensure that special, technical and organisational measures are maintained in an efficient state, in efficient working order and in good repair
 - (d) ensure that equipment and protective systems meet the following requirements:
 - (i) where power failure can give rise to the spread of additional risk, equipment and protective systems must be able to be maintained in a safe state of operation independently of the rest of the plant in the event of power failure
 - (ii) means for manual override must be possible, operated by employees competent to do so, for shutting down equipment and protective systems incorporated within automatic processes which deviate from the intended operating conditions, provided that the provision or use of such means does not compromise safety
 - (iii) on operation of emergency shutdown, accumulated energy must be dissipated as quickly and as safely as possible or isolated so that it no longer constitutes a hazard
 - (iv) necessary measures must be taken to prevent confusion between connecting devices.
 - (e) where the work is carried out in hazardous places or involves hazardous activities, ensure that appropriate systems of work are applied including:
 - (f) the issuing of written instructions for the carrying out of work
 - (g) system of permits to work, with such permits being issued by a person with responsibility for this function prior to the commencement of the work concerned

Figure 15.7 Measures to be taken in respect of dangerous substances

15.16.8 Emergency routes and exits – Article 14

Where necessary, routes to emergency exits from premises and the exits themselves must be kept clear at all times.

The following requirements must be complied with:

- (a) emergency routes and exits must lead as directly as possible to a place of safety;
- (b) in the event of danger, it must be possible for persons to evacuate the premises as quickly and as safely as possible;
- (c) the number, distribution and dimensions of emergency routes and exits must be adequate having regard to the use, equipment and dimensions of the premises and the maximum number of persons who may be present there at any one time;
- (d) emergency doors must open in the direction of escape;
- (e) sliding or revolving doors must not be used for exits specifically intended as emergency exits;
- (f) emergency doors must not be so locked or fastened that they cannot be easily and immediately opened by any person who may require to use them in an emergency;
- (g) emergency routes and exits must be indicated by signs;
- (h) emergency routes and exits requiring illumination must be provided with emergency lighting of adequate intensity in the case of failure of their normal lighting.

15.16.9 Procedures for serious and imminent danger and for danger areas – Article 15

The responsible person must:

- (a) establish appropriate procedures, including safety drills;
- (b) nominate a sufficient number of competent persons to implement evacuation procedures;
- (c) provide adequate safety instruction for restricted areas.

Persons who are exposed to serious and imminent danger must be informed of the nature of the hazard and of the steps taken or to be taken to protect them from it. They must be able to stop work and immediately proceed to a place of safety in the event of their being exposed to serious, imminent and unavoidable danger; and procedures must require the persons concerned to be prevented from resuming work in any situation where there is still a serious and imminent danger.

15.16.10 Additional emergency measures in respect of dangerous substances – Article 16

In order to safeguard persons from an accident, incident or emergency related to the presence of a dangerous substance, the responsible person must (unless the risk assessment shows it is unnecessary) ensure that:

- (a) information on emergency arrangements is available, including:

- (i) details of relevant work hazards and hazard identification arrangements;
 - (ii) specific hazards likely to arise at the time of an accident, incident or emergency;
- (b) suitable warning and other communication systems are established to enable an appropriate response, including remedial actions and rescue operations, to be made immediately when such an event occurs;
 - (c) where necessary, before any explosion conditions are reached, visual or audible warnings are given and relevant persons withdrawn;
 - (d) where the risk assessment indicates it is necessary, escape facilities are provided and maintained to ensure that, in the event of danger, persons can leave endangered places promptly and safely.

The information required must be:

- (a) made available to accident and emergency services;
- (b) displayed at the premises, unless the results of the risk assessment make this unnecessary.

In the event of a fire arising from an accident, incident or emergency related to the presence of a dangerous substance in or on the premises, the responsible person must ensure that:

- (a) immediate steps are taken to:
 - (i) mitigate the effects of the fire;
 - (ii) restore the situation to normal;
 - (iii) inform those persons who may be affected.
- (b) only those persons who are essential for the carrying out of repairs and other necessary work are permitted in the affected area and they are provided with:
 - (i) appropriate PPE and protective clothing; and
 - (ii) any necessary specialised safety equipment and plant which must be used until the situation is restored to normal.

15.16.11 Maintenance – Article 17

Any facilities, equipment and devices provided must be subject to a suitable system of maintenance and maintained in an efficient state, in efficient working order and in good repair.

15.16.12 Safety assistance – Article 18

The responsible person must (except a competent self-employed person) appoint one or more competent persons to assist them in undertaking the preventative and protective measures. If more than one person is appointed, they must make arrangements for ensuring adequate cooperation between them.

The number of persons appointed, the time available for them to fulfil their functions and the means at their disposal must be adequate having regard to the size of the premises, the risks to which relevant persons are exposed and the distribution of those risks throughout the premises.

15.16.13 Provision of information to employees and others – Articles 19 and 20

The responsible person must provide their employees with comprehensible and relevant information on:

- ▶ the risks to them identified by the risk assessment;
- ▶ the preventative and protective measures;
- ▶ the procedures for fire drills;
- ▶ the identities of persons nominated for fire-fighting or fire drills;
- ▶ the risks notified to them regarding shared premises.

Before employing a child, a parent (or guardian) of the child must be provided with comprehensible and relevant information on the risks to that child identified by the risk assessment; the preventative and protective measures; and the risks notified to them regarding shared premises.

Where a dangerous substance is present in or on the premises, additional information must be provided for employees as follows:

- (a) the details of any such substance including:
 - (i) the name of the substance and the risk which it presents;
 - (ii) access to any relevant safety data sheets;
 - (iii) legislative provisions which apply to the substance;
- (b) the significant findings of the risk assessment.

The responsible person must ensure that the employer of any employees from an outside undertaking who are working in or on the premises is provided with comprehensible and relevant information on:

- 1) the risks to those employees;
- 1) the preventative and protective measures taken by the responsible person.

The responsible person must ensure that any person working in their undertaking who is not their employee is provided with appropriate instructions and comprehensible and relevant information regarding any risks to that person.

15.16.14 Capabilities and training – Article 21

The responsible person must ensure that all employees are provided with adequate safety training:

- (a) at the time when they are first employed;
- (b) on their being exposed to new or increased risks because of:
 - (i) their being transferred or given a change of responsibilities;
 - (ii) the introduction of new work equipment or a change respecting work equipment already in use;
 - (iii) the introduction of new technology, or
 - (iv) the introduction of a new system of work, or a

change respecting a system of work already in use.

The training must:

- (a) include suitable and sufficient instruction and training on the appropriate precautions and actions to be taken by the employee;
- (b) be repeated periodically where appropriate;
- (c) be adapted to take account of any new or changed risks to the safety of the employees concerned;
- (d) be provided in a manner appropriate to the risk identified by the risk assessment;
- (e) take place during working hours.

Under the Fire Safety (Employee's Capabilities) Regulations for both England and Wales, every employer must, in entrusting tasks to employees, take into account their capabilities as regards health and safety, so far as those capabilities relate to fire.

15.16.15 Cooperation and coordination – Article 22

Where two or more responsible persons share, or have duties in respect of, premises (whether on a temporary or a permanent basis) each such person must cooperate with, coordinate safety measures and inform the other responsible person concerned so far as is necessary to enable them to comply with the requirements and prohibitions imposed on them.

Where two or more responsible persons share premises (whether on a temporary or a permanent basis) where an explosive atmosphere may occur, the responsible person who has overall responsibility for the premises must coordinate the implementation of all the measures required.

15.16.16 General duties of employees at work – Article 23

Every employee must, while at work:

- (a) take reasonable care for the safety of himself or herself and of other relevant persons who may be affected by acts or omissions at work;
- (b) as regards any duty or requirement imposed on an employer by or under any provision of this Order, the employee must cooperate so far as is necessary to enable that duty or requirement to be performed or complied with;
- (c) inform their employer or any other employee with specific responsibility for the safety of fellow employees:
 - (i) of any work situation which a person with the first-mentioned employee's training and instruction would reasonably consider represented a serious and immediate danger to safety;
 - (ii) of any matter which a person with the first-mentioned employee's training and instruction would reasonably consider represented a

shortcoming in the employer's protection arrangements for safety.

Part 3

15.16.17 Enforcement – Articles 25–31

Part 3 of the Order is about enforcement and penalties.

An enforcing authority may be the fire and rescue authority of the area (most cases), the HSE (nuclear sites, ships and construction sites without other operations) and fire Inspectors maintained by the Secretary of State (armed forces, UK Atomic Energy Authority and Crown premises).

Fire Inspectors and an officer of the fire brigade maintained by the fire and rescue authority, have similar powers (Articles 27 and 28) to inspectors under the HSW Act.

There are differences between the HSW Act and the Fire Order in the notices which can be issued. Appeals can be made against these notices within 21 days and the notices are suspended until the appeal is heard. However, a Prohibition notice stands until confirmed or altered by the court. Fire Inspectors can issue the following notices.

Alterations Notices – Article 29

These may be issued where the premises concerned constitute a serious risk to relevant people or may constitute a serious risk if any change is made to the premises or its use.

Where an Alterations Notice has been served the responsible person must notify the enforcing authority before making any specified changes, which are as follows:

- ▶ a change to the premises;
- ▶ a change to the services, fittings or equipment in or on the premises;
- ▶ an increase in the quantities of dangerous substances which are present in or on the premises;
- ▶ a change in the use of the premises.

In addition, the Alterations Notice may also include the requirement for the responsible person to:

- ▶ record the significant findings of the risk assessment as per Article 9(7) and 9(6);
- ▶ record the fire safety arrangements as per Article 11(1) and 11(2);
- ▶ send a copy of the risk assessment to the enforcing authority, before making the above changes, and a summary of the proposed changes to the general fire precautions.

Enforcement Notices – Article 30

Where the enforcing authority is of the opinion that the responsible person has failed to comply with the

requirements of this Order or any regulations made under it, they can issue an Enforcement Notice which must:

- ▶ state that the enforcing authority is of this opinion,
- ▶ specify the provisions which have not been complied with; and require that person to take steps to remedy the failure within a period (not less than 28 days) from the date of service of the notice

An Enforcement Notice may include directions on the measures needed to remedy the failures. Choices of remedial action must be left open.

Before issuing an Enforcement Notice the enforcing authority must consult the relevant regulatory enforcing authorities including those under HSW Act and the Building Regulations.

Prohibition Notices – Article 31

If the enforcing authority is of the opinion that the risks, relating to escape from the premises, are so serious that the use of the premises ought to be prohibited or restricted they may issue a Prohibition Notice. The notice must:

- ▶ state that the enforcing authority is of this opinion;
- ▶ specify the provisions which give or may give rise to that risk;
- ▶ direct that the use to which the notice relates is prohibited or restricted as may be specified until the specified matters have been remedied

A Prohibition Notice may include directions on the measures needed to remedy the failures. Choices of remedial action must be left open.

A Prohibition Notice takes effect immediately it is served.

Part 4

15.16.18 Offences and Appeals – Articles 32–36

Cases can be tried in a Magistrates' Court or on indictment in the Crown Court.

The responsible person can be liable on conviction on indictment to a fine (not limited), or to imprisonment for a term not exceeding 2 years or both.

Any person can be liable to:

- ▶ on conviction on indictment to a fine (not limited) for an offence where that failure places one or more relevant people at risk of death or serious injury in the case of fire;
- ▶ on summary conviction to a fine at standard levels 3 or 5 depending on the particular offence.

In general, where an offence committed by a body corporate is proved to have been committed with the consent or connivance of any director, manager, secretary or other similar officer of the body corporate

they, as well as the body corporate, are guilty of that offence – Article 32(9).

15.16.19 The Fire Scotland Act 2005

Fire is a devolved subject. Previous fire safety legislation in Scotland has been replaced by the Fire (Scotland) Act 2005, as amended, and by regulations made under that Act. Domestic premises do not generally fall within the scope of this Act, but there are exceptions which include those requiring a licence under the Houses in Multiple Occupation mandatory licensing scheme, and care home premises. However, the legislation does require any equipment or facilities provided for the protection or use of fire-fighters and located in common areas of private dwellings to be maintained.

The Police and Fire Reform (Scotland) Act 2012 part 2 – Fire Reform sets up the Scottish Fire and Rescue Service (SFRS). The 2005 Act is amended so that references to ‘a relevant authority’ is replaced by ‘SFRS’. The SFRS also has the duty to secure ‘best value’ when carrying out its functions (see the SFRS website: <http://www.firescotland.gov.uk>).

Duties imposed by the legislation fall into seven general categories and are similar to those in England and Wales:

1. Carrying out a **fire safety risk assessment** of the premises;
2. Identifying the **fire safety measures** necessary as a result of the fire safety risk assessment outcome;
3. Implementing these fire safety measures using **risk reduction principles**;
4. Putting in place fire safety arrangements for the ongoing **control and review of the fire safety measures**;
 - Complying additionally with the specific requirements of the **fire safety regulations**;
5. Keeping the fire safety risk assessment and outcome under review, and
7. Record keeping.

The following is a summary of the main rights and responsibilities of those covered by the legislation. For a comprehensive list of rights and responsibilities, please refer to the legislation.

(a) Employers:

- ▶ are **entitled** to the cooperation of their employees in respect of fire safety responsibilities and for employees to take reasonable care for their own safety and others whom their actions could affect.
- ▶ **must** carry out (and review regularly) a fire safety risk assessment to identify the potential for fire to occur in the workplace and cause harm to employees and other persons in, or in the immediate vicinity of, the premises.
- ▶ **must** ensure, so far as is reasonably practicable, the safety of their employees from harm caused

by fire in the workplace and take reasonable measures to ensure their safety and that of others there, or in the immediate vicinity. These measures should be aimed at avoiding or reducing any risks identified.

- ▶ **must** provide clear, appropriate information and instruction (and training where necessary) to employees and anyone else working on their premises, e.g. contractors and their employees, in relation to any risks identified and fire safety measures provided.
- ▶ **must** ensure that a record of a fire safety risk assessment is kept (electronically or paper-based) if they employ five or more employees (whether they are based in the premises or not), have a licence (such as a liquor licence) for the premises, are subject to registration (such as care home registration), or an alterations notice requiring this has been served in relation to the premises by the enforcing authority.
- ▶ **must** carry out (or review) a fire safety risk assessment before employing anyone under the age of 18, taking into account their youth and inexperience, and the particular risks they may be exposed to in the workplace. If a child is of school age, their parent must be informed of the risks and the measures taken to avoid or reduce them.
- ▶ **must** ensure that the premises are equipped to an appropriate level, with means of escape (ensuring these can be safely used), means of detecting fire and giving warning in the event of fire, means of fighting fires, and arrangements for action to be taken in the event of fire.
- ▶ **must** ensure that the premises, and any fire safety facilities, equipment and devices are maintained in good order.
- ▶ **must** cooperate with anyone else who has fire safety responsibilities for the same premises (including sharing information about the activities/measures undertaken, where appropriate) and take all reasonable steps to coordinate your fire safety measures regarding the premises.

(b) Employees:

- ▶ are **entitled** to the provision of adequate fire safety measures on the premises to ensure, so far as is reasonably practicable, your safety from harm caused by fire.
- ▶ are **entitled** to appropriate instruction (and training where necessary) about any risks identified on the premises, fire safety measures provided and what to do in the event of a fire.
- ▶ **must** take reasonable care to ensure the workplace is safe from harm caused by fire and do nothing that will place themselves or others at risk.

- ▶ **must** inform their employer (or a fellow employee with specific fire safety responsibilities), of anything relating to the premises which could represent a serious and immediate fire safety danger; of anything which they reasonably consider represents a shortcoming in the employer's fire safety protection arrangements; or in the event of fire.
 - ▶ **must** cooperate with your employer, so far as is necessary, to allow them to comply with their fire safety responsibilities.
- b) Someone who is not an employer but has control of the premises or safety obligations to some extent, such as an owner, tenant, contractor, or occasional user (including voluntary groups):
- ▶ is **entitled** to cooperation from others with fire safety responsibilities for the premises.
 - ▶ **must** carry out (and review regularly as necessary) a fire safety risk assessment of the premises, to the extent of your control, or obligations towards them, identifying any risks to persons in, or in the immediate vicinity of, the premises in respect of harm caused by fire.
 - ▶ **must** take reasonable fire safety measures on the basis of the results of their fire safety risk assessment to ensure, to the extent of the control or obligations they have, the safety of persons from harm caused by fire in the premises.
 - ▶ **must** ensure that the premises are equipped to an appropriate level, relative to the extent of their control or obligations, with means of escape (ensuring they can be safely used), means of detecting fire and giving warning in the event of fire, means of fighting fires, and arrangements for action to be taken in the event of fire.
 - ▶ **must** cooperate (including sharing information where appropriate) with others who have fire safety responsibilities for the premises; take all reasonable steps to coordinate fire safety measures with, taking into account the extent of their control or obligation and others in respect of the premises.
 - ▶ **must** ensure that the premises and any fire safety facilities, equipment and devices are maintained in good order, to the extent of their control or obligation towards the premises.

15.16.20 Fire and Rescue Services (Northern Ireland)

The law applies to almost all premises which are not private dwellings. Examples include:

- ▶ Offices and shops;
- ▶ Premises that provide care, including care homes and hospitals;
- ▶ Pubs, clubs and restaurants;

- ▶ Places of worship;
- ▶ Educational establishments including schools;
- ▶ Theatres and cinemas;
- ▶ Sports centres and other community premises;
- ▶ Hotels and hostels;
- ▶ Guest houses and B&B accommodation;
- ▶ Shared areas of properties common to several households;
- ▶ Houses in multiple occupation;
- ▶ Factories and warehouses;
- ▶ Tents and marquees;
- ▶ Transport premises and facilities;
- ▶ Animal premises and stables;
- ▶ Open air events and venues.

It does not apply to people's private homes, including individual flats in a block or house.

The main requirements under the legislation are very similar to other areas of the UK as follows:

- ▶ Carry out a fire risk assessment for the premises over which you have control;
- ▶ Identify the fire hazards and risks associated with the premises, materials/substances, activities, etc.;
- ▶ Identify the people, or groups of people at risk and anyone who may be especially at risk;
- ▶ Remove and reduce the risks as far as reasonably possible;
- ▶ Put in place general fire precautions to deal with any remaining risks;
- ▶ Implement additional preventative and protective measures if flammable or explosive substances are used or stored on the premises;
- ▶ Develop and implement appropriate emergency procedures in the event of fire;
- ▶ If you have five or more employees, or require a licence or registration, you must record the significant findings of the risk assessment and any actions you have taken to remove/reduce the risk;
- ▶ Review the risk assessment periodically or after significant changes in the workplace.

15.16.21 Further information

Regulatory Reform, England and Wales. The Regulatory Reform (Fire Safety) Order 2005, SI 2005 No. 1541.

There are a number of guides produced by the Department of Communities and Local Government including the following subjects:

Regulatory Reform (Fire Safety) Order 2005 – A short guide to making your premises safe from fire. Product code: 05 FRSD 03546

Fire Risk Assessment – Offices and Shops ISBN 978 1 85112 815 0.

Fire Risk Assessment – Sleeping Accommodation ISBN 978 1 85112 817 4.

Fire Risk Assessment – Residential Care Premises ISBN 978 1 85112 818 1.

- Fire Risk Assessment – Small and Medium Places of Assembly ISBN 978 1 85112 820 4.
- Fire Risk Assessment – Large Places of Assembly ISBN 978 1 85112 821 1.
- Fire Risk Assessment – Factories and Warehouses ISBN 978 1 85112 816 7.
- Fire Risk Assessment – Theatres, Cinemas and Similar Premises ISBN 978 1 85112 822 8.
- Fire Risk Assessment – Educational Premises ISBN 978 1 85112 819 8.
- Fire Risk Assessment – Healthcare Premises ISBN 978 1 85112 824 2.
- Fire Risk Assessment – Transport Premises and Facilities ISBN 978 1 85112 825 9.
- Fire Risk Assessment – Open Air Events and Venues ISBN 978 1 85112 823 5.
- Fire Risk Assessment – Animal Premises and Stables ISBN 978 1 85112 884 6.
- For free downloads see website: <https://www.gov.uk/workplace-fire-safety-your-responsibilities/fire-safety-advice-documents>
- Fire Safety Scotland see: <http://www.firelawscotland.org/v2bbaa.html?pContentID=237>
- Northern Ireland Fire and Rescue Service's see: <http://www.nifrs.org/firesafe/>

15.17 Health and Safety (First Aid) Regulations 1981 as amended

15.17.1 Introduction

These Regulations set out employers' duties to provide adequate first-aid facilities. They define first-aid as:

- ▶ in cases where a person will need help from a medical practitioner or nurse, treatment for the purposes of preserving life and minimising the consequences of injury and illness until such help is obtained;
- ▶ treatment of minor injuries which would otherwise receive no treatment or which do not need treatment by a medical practitioner or nurse.

From October 2013 the HSE have reissued L74 as Guidance only, taking into account the amendment of regulation 3(2) to remove the requirement for the HSE to approve the training and qualifications of appointed first-aid personnel and other earlier amendments.

15.17.2 Duty of the employer – Regulation 3

An employer shall provide, or ensure that there are provided:

- ▶ adequate and appropriate facilities and equipment;
- ▶ such number of suitable persons as is adequate and appropriate for rendering first-aid, they must undergo

such training and have such qualifications as may be appropriate in the circumstances;

- ▶ an appointed person, being someone to take charge of situations as well as first-aid equipment and facilities, where medical aid needs to be summoned. An appointed person will suffice where:
 - ▶ the nature of the work is such that there are no specific serious hazards (offices, libraries, etc.);
 - ▶ the workforce is small; the location makes further provision unnecessary;
 - ▶ there is temporary (not planned holidays) or exceptional absence of the first-aider.

Employers must make an assessment of the first-aid requirements that are appropriate for each workplace. Where an employer provides first-aiders in the workplace, they should ensure they have undertaken suitable training, have an appropriate first-aid qualification and remain competent to perform their role. Typically, first-aiders will hold a valid certificate of competence in either first-aid at work (FAW) or emergency first-aid at work (EFAW). EFAW training enables a first-aider to give emergency first-aid to someone who is injured or becomes ill while at work. FAW training includes EFAW and also equips the first-aider to apply first-aid to a range of specific injuries and illness.

If an employer, after carrying out a needs assessment, decides a first-aider is not required in the workplace, a person should be appointed to take charge of the first-aid arrangements. The role of this appointed person includes looking after the first-aid equipment and facilities and calling the emergency services when required.

There must always be at least an appointed person in every workplace during working hours.

Any first-aid room provided under this Regulation must be easily accessible to stretchers and to any other equipment needed to convey patients to and from the room. It must be signposted according to the safety signs and signals regulations.

15.17.3 Employees information – Regulation 4

Employees must be informed of the arrangements for first-aid, including the location of facilities, equipment and people.

15.17.4 Self-employed – Regulation 5

The self-employed shall provide such first-aid equipment as is appropriate to render first-aid to themselves.

15.17.5 Further information

Basic Advice on First Aid at Work INDG347 (rev2), 2011. ISBN 9780 7176 6435 1. <http://www.hse.gov.uk/pubs/indg347.htm>

First Aid at Work INDG214(rev2), HSE Books, 2014, ISBN 978 0 7176 6469 6. www.hse.gov.uk/pubns/indg214.htm

First Aid at Work. Health and Safety (First Aid) Regulations 1981. Guidance L74 (Third Edition), HSE Books, 2013, ISBN 978 0 7176 6560 0. <http://www.hse.gov.uk/pubns/books/l74.htm>

HSE First Aid Micro Site for General Information, <http://www.hse.gov.uk/firstaid/>

15.18 Health and Safety (Information for Employees) Regulations 1989

15.18.1 General requirements

These Regulations require that the Approved Poster entitled, 'Health and safety – what you should know', is displayed or the Approved Leaflet is distributed.

This information tells employees in general terms about the requirements of health and safety law.

A modern and easy-to-read version of the poster and pocket cards were introduced on 6 April 2009.

The poster has three sections for completion by the employer. These are: 1. Employee representative; 2. Management representative (e.g. appointed competent person to assist managers health and safety appointee); 3. Details of how the Enforcing authority and the Employment Medical Advisory Service (EMAS) can be contacted.

15.18.2 Further information

Health and Safety (Information for Employees) Regulations 1989 (SI No. 682).

Health and Safety Information for Employees (Amendment) Regulations 2009, SI 2009/606.

Health and Safety Law poster A3 size, 2009, ISBN 9780717663699 <http://www.hse.gov.uk/pubns/books/lwposter-a3.htm>

Health and Safety Law What you need to know, 2009, HSE Books, ISBN 9780717665013 <http://www.hse.gov.uk/pubns/lawleaflet.pdf>

15.19 Hazardous Waste (England and Wales) Regulations 2005

15.19.1 Introduction

The Hazardous Waste (England and Wales) Regulations 2005 were implemented on 16 July 2005. These are made under the EPA 1990. There were many changes to the previous Special Waste Regulations, but the two key ones are that hazardous waste producers are now required to pre-register before any hazardous waste can be collected from their premises and the Regulations apply the European Waste Catalogue codes

of hazardous wastes that will affect a much wider range of producers.

15.19.2 Summary

The list below is not exhaustive, but summarises the main requirements. There is also a range of web links that will help to obtain more detail.

From 16 July 2005, it is an offence for hazardous waste to be collected from a site that has not been registered or is exempt.

All non-exempt sites that produce hazardous waste must be registered even if they are unlikely to have that waste collected for some time. Recent EA (Environment Agency) Guidance has clarified that it is an offence to produce hazardous waste on site and not be registered.

The Regulations implement, through the List of Wastes (England) Regulations 2005, the European Waste Catalogue list of Hazardous wastes for the purposes of collection. This means that things like PC monitors, PC base units, fridges, TVs, oily rags and separately collected fluorescent tubes require collection under the new hazardous waste notification and documentation procedures.

The EA will accept postal registrations and registrations can be made online through the following website: www.environment-agency.gov.uk

Each site producing 500 kg or more of hazardous waste each year has to have a separate registration although multiple sites can be registered on the same notification. Therefore, a head office could register all its sites centrally, but each site would have a separate unique registration number and require a separate fee. Registration is annual and must be renewed each year.

Domestic waste is excluded from the Hazardous Waste Regulations on collection from the domestic property, but is then subject to the Regulations if it is separately collected or if it consists of asbestos. This includes Prescription Only Medicines (other than cytotoxic and cytostatic medicines) which will be hazardous waste.

Each consignment of Hazardous Waste will require a consignment note (see Figure 15.8) and a fee to be paid to the EA by the consignee with their quarterly returns to the Agency. Clearly, this will be charged back to the collector, but a consignment might well attract more than one consignment fee if, for instance, it goes through a transfer station and the collector would have to ensure that this was considered in the price.

Collection rounds will be possible but again, each site where the waste is collected would have to be left a copy of the consignment note, so the process of tracking and the paper trail will get quite

PART A Notification Details						
1. Consignment note code: ABC123456789			4. The waste will be taken to (name address and postcode): The Waste Treatment Plant, Low Street, Old Town, The Shire, YY12 4XX			
2. The waste described below is to be removed from: (name, address, postcode, telephone, e-mail & fax) The Green Group, High Street, New Town, The Shire, XX12 3YY Tel 0123 456789, GGG@hotmail.com			5. The waste producer was (if different from 2): (name, address, postcode, telephone, e-mail & fax)			
3. Premises Code (where applicable): ABC123						
PART B Description of waste						
1. The process giving rise to the waste(s) was: Grocery shop. 2. SIC for the process giving rise to the waste: 52.21						
3. WASTE DETAILS (where more than one waste type is collected all of the information given below must be completed for each EWC identified)						
Description of Waste	List of Wastes (EWC) code	Qty (kg)	The chemical / biological components of the waste, their concentrations mg/kg or %	Physical Form	Hazard code(s)	Container type number & size
Full lined bin of glass paint	20 01 27*	8 kg	3-methyl ketone <1% ethyl methyl ketone naphtha D4 deaerated 10-30% naphtha D6 high flash <1% xylene <1%	liquid	H3-B	3 x 10 litre
The information given below is to be completed for each EWC identified						
EWC code	Description for Carriage (UN identification number(s), Proper shipping name(s), UN class(es), Packing group(s))	Special Handling requirements				
20 01 27*	X202, PAINT, Class 3, Flammable liquids, III	EMS P-E, S-E Emergency Action Code -IYE Hazard No. (ADR) 30 Tunnel Restriction Code (DSE)				
PART C Carrier's certificate			PART D Consignor / Holders certificate			
(If more than one carrier is used, please attach a schedule for subsequent carriers. If a schedule of carriers is attached tick here) <input type="checkbox"/>			I certify that the information in A, B & C has been completed and is correct, the carrier is registered or exempt and was advised of the appropriate precautionary measures. All of the waste is packaged and labeled correctly and the carrier has been advised of any special handling requirements.			
I certify that I today collected the consignment and that the details in A2, A4 and B3 are correct & I have been advised of any specific handling requirements.			I confirm that I have fulfilled my duty to apply the waste hierarchy as required Regulation 12 of the Waste (England and Wales) Regulations 2011			
Where this note comprises part of a multiple collection the round number and collection number are: <input type="text"/>			1. Consignor name (please PRINT): Mr Eric Smith On behalf of (name, address, postcode, telephone, e-mail & fax): The Green Group, High Street, New Town, The Shire, XX12 3YY Tel 0123 456789, GGG@hotmail.com			
Carrier driver name (please PRINT) Tony Driver			Signature E. Smith Time 16.00 Date 29/12/09			
On behalf of (name, address, postcode, telephone, e-mail & fax) The Waste Treatment Plant, Low Street, Old Town, The Shire, YY12 4XX Tel 0987 654321 e-mail waste@hotmail.com						
Carriers registration no / reason for exemption reason: CBX123456						
Vehicle registration no AB57 WEE						
Signature T. Driver Time 16.00 Date 29/12/2012						
PART E Consignee's Certificate (where more than one waste type is collected all of the information given below must be completed for each EWC)						
Individual EWC code(s) received	Quantity of each EWC code received (kg)	EWC code accepted / rejected	Waste Management operation (R or D code)			
20 01 27*	8	accepted	R			
1. I received this waste at the address given in A4 on Date 29/12/2012 Time 17.30 Name: Peter Harris						
2. Vehicle registration no (or mode of transport if not by road): AB57 WEE On behalf of (name, address, postcode, tel, e-mail & fax): The Waste Treatment Plant, Low Street, Old Town, The Shire, YY12 4XX Tel 0987 654321 e-mail waste@hotmail.com						
3. Where waste is rejected please provide details						
I certify that the waste management licence / permit / authorised exemption no(s): EPRX123456789012						
authorizes the management of the waste described in B at the address given in A4						
Where the consignment forms part of a multiple collection, as identified in Part C, I certify that the total number of consignments forming the collection are <input type="text"/>						
Date 17.30 Time 20/12/2009						

Figure 15.8 A completed Hazardous Waste Consignment Note.

complex especially as each collection will count as a consignment from the fee point of view.

The Regulations ban the mixing of hazardous waste and state that it must be stored separately on site. It prohibits businesses like offices or retail premises from

discarding items of hazardous waste in their general waste bins.

Businesses also have a duty of care to store their waste appropriately. The key factors are that they ensure waste is:

- ▶ secure;
- ▶ contained so that it cannot escape; and
- ▶ protected from the weather, vehicles including fork-lift trucks, scavengers and pests.

For certain wastes there are additional storage requirements:

- ▶ oil – there is further guidance in Pollution Prevention Guidance PPG 2 from the Environment Agency;
- ▶ chemicals – can have different properties and have the potential to react dangerously if not stored properly.

Registration as a Hazardous Waste producer places a statutory duty on the EA to inspect the site where the hazardous waste arises

15.19.3 Further information

Small businesses A guide to Hazardous Waste Regulations, Environment Agency 2013, HWR01A.

15.20 Ionising Radiations Regulations 1999

15.20.1 Introduction

The Ionising Radiations Regulations 1999 (IRR99) implement the majority of the Basic Safety Standards Directive 96129/Euratom (BSS Directive). From 1 January 2000, they replaced the Ionising Radiations Regulations 1985 (IRR85) (except for Regulation 26 (special hazard assessments)).

The main aim of the Regulations and the supporting ACoP is to establish a framework for ensuring that exposure to ionising radiation arising from work activities, whether from man-made or natural radiation and from external radiation (e.g. X-ray set) or internal radiation (e.g. inhalation of a radioactive substance), is kept as low as reasonably practicable and does not exceed dose limits specified for individuals. IRR99 also:

- (a) replaces the Ionising Radiations (Outside Workers) Regulations 1993 (OWR93), which were made to implement the Outside Workers Directive 90/641/Euratom;
- (b) implements a part of the Medical Exposures Directive 97143/Euratom in relation to equipment used in connection with medical exposures.

The guidance which accompanies the Regulations and ACoP gives detailed advice about the scope and duties of the requirements imposed by IRR99. It is aimed at employers with duties under the Regulations but should also be useful to others such as radiation protection advisers, health and safety officers, radiation protection supervisors and safety representatives.

15.20.2 Working with ionising radiation

Essentially, work with ionising radiation means:

- (a) a practice, which involves the production, processing, handling, use, holding, storage, transport or disposal of artificial radioactive substances and some naturally occurring sources, or the use of electrical equipment emitting ionising radiation at more than 5 kV (see definition of practice in Regulation 2(1));
- (b) work in places where the radon gas concentration exceeds the values in Regulation 3(1)(b); or
- (c) work with radioactive substances containing naturally occurring radionuclides not covered by the definition of a practice.

15.20.3 Radiation employers

Radiation employers are essentially those employers who work with ionising radiation, that is they carry out:

- (a) a practice (see definition in Regulation 2(1)); or
- (b) work in places where the radon gas concentration exceeds the values in Regulation 3(1)(b); or
- (c) work with radioactive substances containing naturally occurring radionuclides not covered by the definition of a practice.

15.20.4 Duties of self-employed people

A self-employed person who works with ionising radiation will simultaneously have certain duties under these Regulations, both as an employer and as an employee.

For example, self-employed persons may need to take such steps as:

- ▶ carrying out assessments under Regulation 7;
- ▶ providing control measures under Regulation 8 to restrict exposure;
- ▶ designating themselves as classified persons under Regulation 20;
- ▶ making suitable arrangements under Regulation 21 with one or more approved dosimetry services (ADS) for assessment and recording of doses they receive;
- ▶ obtaining a radiation passbook and keeping it up to date in accordance with Regulation 2;
- ▶ if they carry out services as an outside worker, making arrangements for their own training as required by Regulation 14;
- ▶ ensuring they use properly any dose meters provided by an ADS as required by regulation.

15.20.5 General requirements

Some of the major considerations are:

- ▶ notification to the HSE of specific work unless specified in Schedule 1 to the Regulations (Regulation 6);

- ▶ carrying out prior risk assessment by a radiation employer before commencing a new activity (Regulation 7);
- ▶ use of PPE (Regulation 9);
- ▶ maintenance and examination of engineering controls and PPE (Regulation 10);
- ▶ dose limitations (Regulation 11);
- ▶ contingency plans for emergencies (Regulation 12);
- ▶ radiation protection adviser appointment (Regulation 13);
- ▶ information, instruction and training (Regulation 14).

15.20.6 Prior risk assessment

Where a radiation employer is required to undertake a prior risk assessment, the following matters need to be considered, where they are relevant:

- ▶ the nature of the sources of ionising radiation to be used, or likely to be present, including accumulation of radon in the working environment;
- ▶ estimated radiation dose rates to which anyone can be exposed;
- ▶ the likelihood of contamination arising and being spread;
- ▶ the results of any previous personal dosimetry or area monitoring relevant to the proposed work;
- ▶ advice from the manufacturer or supplier of equipment about its safe use and maintenance;
- ▶ engineering control measures and design features already in place or planned;
- ▶ any planned systems of work; estimated levels of airborne and surface contamination likely to be encountered;
- ▶ the effectiveness and the suitability of PPE to be provided;
- ▶ the extent of unrestricted access to working areas where dose rates or contamination levels are likely to be significant; possible accident situations, their likelihood and potential severity;
- ▶ the consequences of possible failures of control measures – such as electrical interlocks, ventilation systems and warning devices – or systems of work; steps to prevent identified accident situations, or limit their consequences.

This prior risk assessment should enable the employer to determine:

- ▶ what action is needed to ensure that the radiation exposure of all persons is kept as low as reasonably practicable (Regulation 8(1));
- ▶ what steps are necessary to achieve this control of exposure by the use of engineering controls, design features, safety devices and warning devices (Regulation 8(2)(a)) and, in addition, by the development of systems of work (Regulation 8(2)(b));
- ▶ whether it is appropriate to provide PPE and if so what type would be adequate and suitable (Regulation 8(2)(c));

- ▶ whether it is appropriate to establish any dose constraints for planning or design purposes, and if so, what values should be used (Regulation 8(3));
- ▶ the need to alter the working conditions of any female employee who declares she is pregnant or is breastfeeding (Regulation 8(5));
- ▶ an appropriate investigation level to check that exposures are being restricted as far as are reasonably practicable (Regulation 8(7));
- ▶ what maintenance and testing schedules are required for the control measures selected (Regulation 10);
- ▶ what contingency plans are necessary to address reasonably foreseeable accidents (Regulation 12);
- ▶ the training needs of classified and non-classified employees (Regulation 14);
- ▶ the need to designate specific areas as controlled or supervised areas and to specify local rules (Regulations 16 and 17);
- ▶ the actions needed to ensure restriction of access and other specific measures in controlled or supervised areas (Regulation 18);
- ▶ the need to designate certain employees as classified persons (Regulation 20);
- ▶ the content of a suitable programme of dose assessment for employees designated as classified persons and for others who enter controlled areas (Regulations 18 and 21);
- ▶ the responsibilities of managers for ensuring compliance with these Regulations;
- ▶ an appropriate programme of monitoring or auditing of arrangements to check that the requirements of these Regulations are being met.

15.20.7 Further information

The HSE have also produced a number of information sheets, which are available free at: <http://www.hse.gov.uk/radiation/ionising/publications.htm>

Work with ionising radiation, L121, 2000, HSE Books, ISBN 978 0 7176 1746 3. This is a large document and need only be studied by those with a specific need to control IR. <http://www.hse.gov.uk/pubns/books/l121.htm>

Working safely with ionising radiation: Guidelines for expectant or breastfeeding mothers, INDG334, 2001, <http://www.hse.gov.uk/pubns/indg334.pdf>

15.21 Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 as amended in 2002

15.21.1 Introduction

This summary gives information about the LOLER 1998 which came into force on 5 December 1998.

The Regulations aim to reduce risks to people's health and safety from lifting equipment provided for use at

work. In addition to the requirements of LOLER, lifting equipment is also subject to the requirements of the PUWER 1998.

Generally, the Regulations require that lifting equipment provided for use at work is:

- ▶ strong and stable enough for the particular use and marked to indicate SWL;
- ▶ positioned and installed to minimise any risks;
- ▶ used safely, i.e. the work is planned, organised and performed by competent people;
- ▶ subject to ongoing thorough examination and, where appropriate, inspection by competent people.

15.21.2 Definition

Lifting equipment includes **any equipment used at work for lifting or lowering loads**, including attachments used for anchoring, fixing or supporting it. The Regulations cover a wide range of equipment including cranes, fork-lift trucks, lifts, hoists, mobile elevating work platforms and vehicle inspection platform hoists. The definition also includes lifting accessories such as chains, slings, eyebolts, etc. LOLER **does not** apply to escalators; these are covered by more specific legislation, i.e. the Workplace (Health, Safety and Welfare) Regulations 1992.

If employees are allowed to provide their own lifting equipment, then this too is covered by the Regulations.

15.21.3 Application

The Regulations apply to an employer or self-employed person providing lifting equipment for use at work, or who has control of the use of lifting equipment. They do not apply to equipment to be used primarily by members of the public, for example lifts in a shopping centre. However, such circumstances are covered by the HSW Act 1974.

LOLER applies to the way lifting equipment is used in industry and commerce. LOLER applies only to work activities, for example:

- ▶ a crane on hire to a construction site;
- ▶ a contract lift;
- ▶ a passenger lift provided for use of workers in an office block;
- ▶ refuse collecting vehicles lifting on a public road;
- ▶ patient hoist;
- ▶ fork-lift truck.

These Regulations add to the requirements of PUWER 98 and should be interpreted with them. For example, when selecting lifting equipment, PUWER Regulation 4, regarding suitability, should be considered in connection with:

- ▶ ergonomics;
- ▶ the conditions in which the equipment is to be used;
- ▶ safe access and egress;

- ▶ preventing slips, trips and falls;
- ▶ protecting the operator.

While employees do not have duties under LOLER, they do have general duties under the HSW Act and the MHSWR 1992, for example to take reasonable care of themselves and others who may be affected by their actions and to cooperate with others.

The Regulations cover places where the HSW Act applies – these include factories, offshore installations, agricultural premises, offices, shops, hospitals, hotels, places of entertainment, etc.

15.21.4 Strength and stability – Regulation 4

Lifting equipment shall be of adequate strength and stability for each load, having regard in particular to the stress induced at its mounting or fixing point.

Every part of a load and anything attached to it and used in lifting it shall be of adequate strength.

Account must be taken of the combination of forces to which the lifting equipment will be subjected, as well as the weight of any lifting accessories. The equipment should include an appropriate factor of safety against failure.

Stability needs to take into account the nature, load-bearing strength, stability, adjacent excavations and slope of the surface. For mobile equipment, keeping rails free of obstruction and tyres correctly inflated must be considered.

15.21.5 Lifting equipment for lifting persons – Regulation 5

To ensure safety of people being lifted, there are additional requirements for such equipment. The use of equipment not specifically designed for raising and lowering people should only be used in exceptional circumstances.

The Regulation applies to all lifting equipment used for raising and lowering people and requires that lifting equipment for lifting persons shall:

- ▶ prevent a person using it from being crushed, trapped or struck, or falling from the carrier;
- ▶ prevent, safely, persons using it while carrying out work from the carrier being crushed, trapped or struck or falling from the carrier;
- ▶ have suitable devices to prevent the risk of the carrier falling. If a device cannot be fitted, the carrier must have:
 - an enhanced safety coefficient suspension rope or chain;
 - the rope or chain inspected every working day by a competent person;
- ▶ be such that a person trapped in any carrier is not thereby exposed to any danger and can be freed.

15.21.6 Positioning and installation – Regulation 6

Lifting equipment must be positioned and installed so as to reduce the risks, *safair*, from:

- ▶ equipment or a load striking another person;
- ▶ a load drifting, falling freely or being released unintentionally;

and it is otherwise safe.

Lifting equipment should be positioned and installed to minimise the need to lift loads over people and to prevent crushing in extreme positions. It should be designed to stop safely in the event of a power failure and not release its load. Lifting equipment, which follows a fixed path, should be enclosed with suitable and substantial interlocked gates and any necessary protection in the event of power failure.

15.21.7 Marking of lifting equipment – Regulation 7

Machinery and accessories for lifting loads shall be clearly marked to indicate their SWL, and:

- ▶ where the SWL depends on the configuration of the lifting equipment:
 - ▶ the machinery should be clearly marked to indicate its SWL for each configuration;
 - ▶ information which clearly indicates its SWL for each configuration should be kept with the machinery;
- ▶ accessories for lifting (e.g. hooks, slings) are also marked in such a way that it is possible to identify the characteristics necessary for their safe use (e.g. if they are part of an assembly);
- ▶ lifting equipment which is designed for lifting people is appropriately and clearly marked;
- ▶ lifting equipment not designed for lifting people, but which might be used in error, should be clearly marked to show it is not for lifting people.

15.21.8 Organisation of lifting operations – Regulation 8

Every lifting operation, that is lifting or lowering of a load, shall be:

- ▶ properly planned by a competent person,
- ▶ appropriately supervised;
- ▶ carried out in a safe manner.

The person planning the operation should have adequate practical and theoretical knowledge and experience of planning lifting operations. The plan will need to address the risks identified by the risk assessment and identify the resources, the procedures and the responsibilities required so that any lifting operation is carried out safely. For routine simple lifts a plan will normally be left to the people using the lifting equipment. For complex lifting operations, for example

where two cranes are used to lift one load, a written plan may need to be produced each time.

The planning should take account of avoiding suspending loads over occupied areas, visibility, attaching/detaching and securing loads, the environment, location, overturning, proximity to objects, lifting of people and pre-use checks of the equipment.

15.21.9 Thorough examination and inspection – Regulations 9 and 11

Before using lifting equipment for the first time by an employer, it must be thoroughly examined for any defect unless:

- ▶ the lifting equipment has not been used before;
- ▶ an EC declaration of conformity (where one should have been drawn up) has been received or made more than 12 months before the lifting equipment put into service;
- ▶ if it is obtained from another undertaking, it is accompanied by physical evidence of an examination.

A copy of this thorough examination report shall be kept for as long as the lifting equipment is used (or, for a lifting accessory, 2 years after the report is made (Regulation 11)).

Where safety depends on the installation conditions, the equipment shall be thoroughly examined:

- ▶ after installation and before being put into service;
- ▶ after assembly and before being put into service at a new site or in new location to ensure that it has been installed correctly and is safe to operate.

A copy of the thorough examination report shall be kept for as long as the lifting equipment is used at the place it was installed or assembled (Regulation 11).

Lifting equipment which is exposed to conditions causing deterioration that may result in dangerous situations, shall be:

- ▶ thoroughly examined at least every 6 months (for lifting equipment for lifting persons, or a lifting accessory); at least every 12 months (for other lifting equipment); or in accordance with an examination scheme; and each time that exceptional circumstances, liable to jeopardise the safety of the lifting equipment, have occurred and a copy of the report kept until the next report is made, or for 2 years (whichever is longer);
- ▶ inspected, if appropriate, by a competent person at suitable intervals between 'thorough examinations' (and a copy of the record kept until the next record is made).

All lifting equipment shall be accompanied by physical evidence that the last 'thorough examination' has been

carried out before it leaves an employer's undertaking (or before it is used after leaving another undertaking).

The user, owner, manufacturer or some other independent party may draw up examination schemes, provided they have the necessary competence.

Schemes should specify the intervals at which lifting equipment should be thoroughly examined and, where appropriate, those parts that need to be tested. The scheme should take account, for example, of its condition, the environment in which it is used, the number of lifting operations and the loads lifted.

The 'competent person' carrying out a thorough examination should have appropriate practical and theoretical knowledge and experience of the lifting equipment to be examined to enable them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the lifting equipment. They should also determine whether a test is necessary and the most appropriate method for carrying it out.

15.21.10 Reports and defects – Regulation 10

The person making a 'thorough examination' of lifting equipment shall:

- ▶ notify the employer forthwith of any defect which, in their opinion, is or could become, dangerous; as soon as is practicable (within 28 days) write an authenticated report to:
 - ▶ the employer;
 - ▶ any person who hired or leased the lifting equipment, containing the information specified in Schedule 1.
- ▶ send a copy (as soon as is practicable) to the relevant enforcing authority where there is, in their opinion, a defect with an existing or imminent risk of serious personal injury (this will always be the HSE if the lifting equipment has been hired or leased).

Every employer notified of a defect following a 'thorough examination' of lifting equipment should ensure that it is not used:

- ▶ before the defect is rectified;
- ▶ after a time specified in the schedule accompanying the report.

The person making an 'inspection' shall also notify the employer when, in his or her opinion, a defect is, or could become, dangerous and, as soon as is practicable, make a record of the inspection in writing.

15.21.11 Reports – Schedule 1

Schedule 1 lists the information to be contained in a report of a thorough examination. For example, name and address; identity of equipment; date of last thorough examination; SWL; appropriate interval; any dangerous or potentially dangerous defects; repairs

required; date of next examination and test; details of the competent person.

15.21.12 Further information

HSE LOLER website <http://www.hse.gov.uk/work-equipment-machinery/loler.htm>

Lifting Equipment and Lifting Operations Regulations 1998, SI No., OPSI website: <http://www.legislation.gov.uk/ukksi/1998/2307/contents/made>

Lifting Equipment at work. A brief guide, INDG290(rev1), HSE books, 2013, ISBN 9780 7176 6483 2

LOLER 1998 Lifting Operations and Lifting Equipment Regulations 1998, Open Learning Guidance. 1999, HSE Books, ISBN 978 0 7176 2464 5. <http://www.hse.gov.uk/pubns/books/loler.htm>

Rider-Operated lift trucks, L117, 2013, HSE Books, ISBN 978 0 7176 6441 2 <http://www.hse.gov.uk/pubns/books/l117.htm>

Safe Use of Lifting Equipment, Lifting Operations and Lifting Equipment Regulations, 1998, Approved Code of Practice and Guidance, L113 2nd ed, 2014, HSE Books, ISBN 978 0 7176 6586 0. <http://www.hse.gov.uk/pubns/books/l113.htm?ebul=hsegen&cr=2/22-dec-14>

Thorough Examination and Testing of Lifts. Simple Guidance for Lift Owners INDG339 (rev1), HSE Books, 2008, ISBN 978 0 7176 6255 5. <http://www.hse.gov.uk/pubns/indg339.htm>

Thorough examination of lifting equipment, A simple guide for employers, INDG422, HSE, 2008, ISBN 97807176 6305 7 <http://www.hse.gov.uk/pubns/indg422.pdf>

15.22 Management of Health and Safety at Work Regulations 1999 as amended in 2003 and 2006

15.22.1 General

These Regulations give effect to the European Framework Directive on health and safety. They supplement the requirements of the HSW Act 1974 and specify a range of management issues, most of which must be carried out in all workplaces. The aim is to map out the organisation of precautionary measures in a systematic way, and to make sure that all staff are familiar with the measures and their own responsibilities. They were amended slightly in 2003, particularly in relation to civil liability (Regulation 22).

15.22.2 Risk assessment – Regulation 3

Every employer is required to make a 'suitable and sufficient' assessment of risks to employees, and

- ▶ physical or psychological capacity;
- ▶ pace of work;
- ▶ temperature extremes, noise or vibration;
- ▶ radiation;
- ▶ compressed air and diving;
- ▶ hazardous substances;
- ▶ lack of training and experience.

The exception to this is young persons over school-leaving age:

- ▶ where the work is necessary for their training;
- ▶ where they will be supervised by a competent person;
- ▶ where the risk will be reduced to the lowest level that is reasonably practicable.

The risk assessment must take the following specific factors into account:

- ▶ the fitting-out and layout of the workplace and the particular site where they will work;
- ▶ the nature of any physical, biological and chemical agents they will be exposed to, for how long and to what extent;
- ▶ what types of work equipment will be used and how this will be handled;
- ▶ how the work and processes involved are organised;
- ▶ the need to assess and provide health and safety training;
- ▶ risks from the particular agents, processes and work.

15.22.14 Provisions as to liability - Regulation 21

This provision is to prevent a defence for an employer by reason of any act or default by an employee or a competent person appointed under Regulation 7. Employees' duties to take reasonable care of their own health and safety and that of others affected by their work activities are unaffected by this provision.

15.22.15 Restriction of civil liability for breach of statutory duty - Regulation 22

Further restrictions have been imposed by the Enterprise and Regulatory Reform Act 2013. It amends the Health and Safety at Work etc. Act 1974 Section 47, to remove the right of civil action against employers and other duty-holders for breach of statutory duty in relation to certain health and safety legislation, other than where such a right is specifically provided for which has been done by the Health and Safety at Work etc. Act 1974 (Civil Liability) (Exceptions) Regulations 2013 which changed Regulation 22 (see below). This will address the potential unfairness that arises where an employer can be found liable to pay compensation to an employee despite having taken reasonable steps to protect them.

Regulation 22 of the Management of Health and Safety at Work Regulations ('the 1999 Regulations') excluded third parties from bringing claims for breach of a duty

contained in those Regulations against employers and employees. This exclusion is no longer required because Section 47 of the 1974 Act now automatically excludes liability and express provision is only required for exceptions.

Regulation 22 has been changed to the following:

22.—(1) Breach of a duty imposed by regulation 16, 16A, 17 or 17A shall, so far as it causes damage, be actionable by the new or expectant mother.

(2) Any term of an agreement which purports to exclude or restrict any liability for such a breach is void.

15.22.16 Further information

Health and Safety made simple: The basics for your business, INDG 449, HSE Books, <http://www.hse.gov.uk/pubns/indg449.pdf>

Risk Assessment HSE INDG163 (rev 4), 2014, HSE Books, <http://www.hse.gov.uk/pubns/indg163.pdf>

Leading Health and Safety at Work. Action for Directors and Board Members, business owners and organisations of all sizes INDG417(rev1), HSE Books, 2013, <http://www.hse.gov.uk/leadership/>

The Management of Health and Safety at Work Regulations 1999, ISBN 9780 11 025051 6,

OPSI website: http://www.opsi.gov.uk/si/si1999/uksi_19993242_en.pdf

Managing for Health and Safety HSG65, 2013, ISBN 9780717664566 see:65 <http://www.hse.gov.uk/pubns/books/hsg65.htm>

The health and safety toolbox: How to control risks at work HSG268, 2014, ISBN 9780717665877 <http://www.hse.gov.uk/toolbox/index.htm>

15.23 Manual Handling Operations Regulations (MHO) 1992 as amended in 2002

15.23.1 General

The Regulations apply to the manual handling (any transporting or supporting) of loads, that is by human effort, as opposed to mechanical handling by fork-lift truck, crane, etc. Manual handling includes lifting, putting down, pushing, pulling, carrying or moving. The human effort may be applied directly to the load, or indirectly by pulling on a rope, chain or lever. Introducing mechanical assistance, like a hoist or sack truck, may reduce but not eliminate manual handling, as human effort is still required to move, steady or position the load.

The application of human effort for purposes other than transporting or supporting a load, for example pulling on a rope to lash down a load or moving a machine control, is not a manual handling operation. A load is a discrete movable object, but it does not include an implement, tool or machine while being used.

injury in the context of these Regulations means to any part of the body. It should take account of the physical characteristics of the load which might affect grip or cause direct injury, for example slipperiness, sharp edges and extremes of temperature. It does not include injury

15.23.2 Duties of employers: avoidance of manual handling – Regulation 4(1)(a)

Employers should take steps to avoid the need for employees to carry out MHO which involve a risk of their being injured.

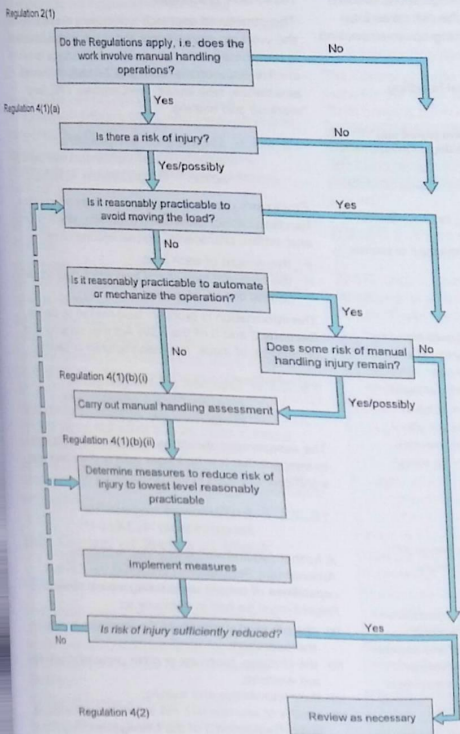


Figure 15.9 Manual Handling Operations Regulations – flow chart

caused by any toxic or corrosive substance which has leaked from a load, is on its surface or is part of the load. See Figure 15.9, which shows a flow chart for the Regulations.

The guidance suggests that a preliminary assessment should be carried out when making a general risk assessment under the MHSWR 1999. Employers should consider whether the operation can be eliminated, automated or mechanised.

15.23.3 Duties of employers: assessment of risk – Regulation 4(1)(b)(i)

Where it is not reasonably practicable to avoid MHO, employers must make a suitable and sufficient risk assessment of all such MHO in accordance with the requirements of Schedule 1 to the Regulations (shown in Table 15.6). This duty to assess the risk takes into account the task, the load, the working environment and individual capability.

Table 15.6 Schedule 1 to the Manual Handling Operations Regulations

Factors to which the employer must have regard and questions they must consider when making an assessment of manual handling operations

Factors	Questions
1. The tasks	<p>Do they involve:</p> <ul style="list-style-type: none"> Holding or manipulating loads at distance from trunk? Unsatisfactory bodily movement or posture, especially: Twisting the trunk? Stooping? Reaching upwards? Excessive movement of loads especially: Excessive lifting or lowering distances? Excessive carrying distances? Excessive pulling or pushing of loads? Risk of sudden movement of loads? Frequent or prolonged physical effort? Insufficient rest or recovery periods? A rate of work imposed by a process?
2. The loads	<p>Are they:</p> <ul style="list-style-type: none"> Heavy? Bulky or unwieldy? Difficult to grasp? Unstable, or with contents likely to shift? Sharp, hot or otherwise potentially damaging?
3. The working environment	<p>Are there:</p> <ul style="list-style-type: none"> Space constraints preventing good posture? Uneven, slippery or unstable floors? Variations in level of floors or work surfaces? Extremes of temperature or humidity? Conditions causing ventilation problems or gusts of wind? Poor lighting conditions?
4. Individual capability	<p>Does the job:</p> <ul style="list-style-type: none"> Require unusual strength, height, etc.? Create a hazard to those who might reasonably be considered to be pregnant or have a health problem? Require special information or training for its safe performance?
5. Other factors	<ul style="list-style-type: none"> Is movement or posture hindered by personal protective equipment or by clothing?

15.23.4 Duties of employers: reducing the risk of injury – Regulation 4(1)(b)(ii)

Where it is not reasonably practicable to avoid the MHO with which there is a risk of injury, employers must take steps to reduce the risk of injury to the lowest level reasonably practicable.

The structured approach (considering the task, the load, the working environment and the individual capability) is recommended in the guidance. The steps taken will involve ergonomics, changing the load, mechanical assistance, task layout, work routines, PPE, team working and training.

15.23.5 Duties of employers: additional information on the load – Regulation 4(1)(b)(iii)

Employers must take appropriate steps where manual handling cannot be avoided to provide general indications and, where practicable, precise information on:

- ▶ the weight of each load;
- ▶ the heaviest side of any load which does not have a central centre of gravity.

The information is probably best marked on the load. Sections 3 and 6 of the HSW Act may place duties on originators of loads, like manufacturers or packers.

15.23.6 Duties of employers: reviewing assessment – Regulation 4(2)

The assessment should be reviewed if there is reason to suspect that it is no longer valid or there have been significant changes in the particular MHO.

15.23.7 Individual capability – Regulation 4(3)(a)–(f)

A further requirement was added in 2002 by Amendment Regulations concerning the individual capabilities of people undertaking manual handling. Regard must be had in particular to:

- (a) the physical suitability of the employee to carry out the operation;
- (b) the clothing, footwear or other personal effects they are wearing;
- (c) their knowledge and training;
- (d) results of any relevant risk assessments carried out under Regulation 3 of the Management Regulations 1999;
- (e) whether the employee is within a group of employees identified by that assessment as being especially at risk;
- (f) the results of any health surveillance provided pursuant to Regulation 6 of the Management Regulations 1999.

15.23.8 Duty of employees – Regulation 5

Each employee, while at work, has to make proper use of any system of work provided for their use. This is in addition to other responsibilities under the HSW Act and the MHSWR.

The provisions do not include well-intentioned improvisation in an emergency, for example rescuing a casualty or fighting a fire.

15.23.9 Further information

Making the Best Use of Lifting and Handling Aids INDG398(rev1), HSE Books, 2013, <http://www.hse.gov.uk/pubns/indg398.pdf>

Managing upper limb disorders in the workplace, INDG171(rev2), 2013, <http://www.hse.gov.uk/pubns/indg171.pdf>

Manual Handling Assessment Chart INDG383(rev1), HSE Books, 2014, <http://www.hse.gov.uk/pubns/indg383.htm>

Manual handling at work. A brief guide, INDG143(rev3), 2012, ISBN 9780 7176 6478 8. <http://www.hse.gov.uk/pubns/indg143.htm>

Manual Handling, Manual Handling Operations Regulations 1992 (as amended), Guidance on Regulations Revised, L23, HSE Books, 2004, ISBN 978 0 7176 2823 0. <http://www.hse.gov.uk/pubns/books/l23.htm>

Manual Handling, Solutions You Can Handle HSG 115, 1984, HSE Books, ISBN 978 0 7176 0693 1. <http://www.hse.gov.uk/pubns/books/hsg115.htm>

Upper limb disorders in the workplace, HSG60, 2002, ISBN 9780 7176 1978 8. <http://www.hse.gov.uk/pubns/books/hsg60.htm>

15.24 Control of Noise at Work Regulations 2005

15.24.1 Introduction

The Control of Noise at Work Regulations 2005 require employers to prevent or reduce risks to health and safety from exposure to noise at work. Employees also have duties under the Regulations.

The Regulations require employers to:

- ▶ assess the risks to their employees from noise at work;
- ▶ take action to reduce the noise exposure that produces those risks;
- ▶ provide their employees with hearing protection if they cannot reduce the noise exposure enough by using other methods;
- ▶ make sure the legal limits on noise exposure are not exceeded;

- ▶ provide their employees with information, instruction and training;
- ▶ carry out health surveillance where there is a risk to health.

The Regulations do not apply to:

- ▶ members of the public exposed to noise from their non-work activities, or making an informed choice to go to noisy places;
- ▶ low-level noise which is a nuisance but causes no risk of hearing damage.

The Control of Noise at Work Regulations came into force for the music and entertainment sectors on 6 April 2008 bringing them in line with all other sectors where the regulations have been in force since April 2006. The Control of Noise at Work Regulations now apply to pubs and clubs, amplified live music events, orchestras and other premises where live music or recorded music is played.

15.24.2 Exposure limit values and action levels – Regulation 4

The Control of Noise at Work Regulations require employers to take specific action at certain action values. These relate to:

- ▶ the levels of exposure to noise of their employees averaged over a working day or week;
- ▶ the maximum noise (peak sound pressure) to which employees are exposed in a working day.

The values are:

- ▶ lower exposure action values:
 - ▷ daily or weekly exposure of 80 dB (A-weighted)
 - ▷ peak sound pressure of 135 dB (C-weighted).
- ▶ upper exposure action values:
 - ▷ daily or weekly exposure of 85 dB (A-weighted),
 - ▷ peak sound pressure of 137 dB (C-weighted).

Figure 15.10 helps decide what needs to be done.

There are also levels of noise exposure which must not be exceeded:

- ▶ exposure limit values:
 - ▷ daily or weekly exposure of 87 dB (A-weighted);
 - ▷ peak sound pressure of 140 dB (C-weighted).

These exposure limit values take account of any reduction in exposure provided by hearing protection.

15.24.3 Risk assessment – Regulation 5

If employees are likely to be exposed to noise at or above the lower exposure value, a suitable and sufficient assessment of the risks must be made. Employers need to decide whether any further action is needed, and plan how to do it.

The risk assessment should:

- ▶ identify where there may be a risk from noise and who is likely to be affected;

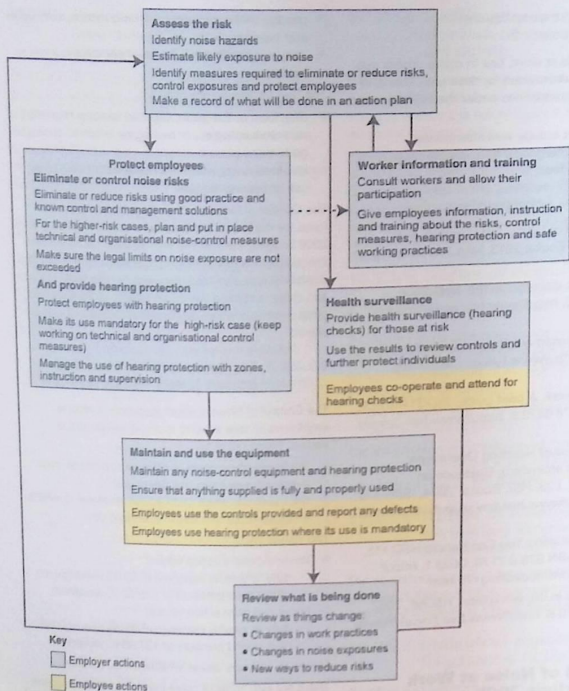


Figure 15.10 What needs to be done under the Control of Noise at Work Regulations 2005

contain a reliable estimate of employees' exposures, and compare the exposure with the exposure action values and limit values;

- ▶ identify what needs to be done to comply with the law, e.g. whether noise-control measures or hearing protection are needed, and, if so, where and what type;
- ▶ identify any employees who need to be provided with health surveillance and whether any are at particular risk.

The risk assessment should include consideration of:

- ▶ the level, type and duration of exposure, including any exposure to peak sound pressure;

- ▶ the effects of exposure to noise on employees or groups of employees whose health is at particular risk;
- ▶ sharp any effects on the health and safety of employees resulting from interaction, e.g. between noise and vibration;
- ▶ any indirect effects from the interaction between noise and audible warnings;
- ▶ manufacturers' information;
- ▶ availability of alternative equipment designed to reduce noise emissions;
- ▶ any extension to noise exposure due to extended hours or in supervised rest facilities;

- ▶ information following health surveillance;
- ▶ availability of personal hearing protectors with adequate attenuation characteristics.

It is essential that employers can show that their estimate of employees' exposure is representative of the work that they do. It needs to take account of:

- ▶ the work they do or are likely to do;
- ▶ the ways in which they do the work;
- ▶ how it might vary from one day to the next.

The estimate must be based on reliable information, for example measurements in their own workplace, information from other similar workplaces or data from suppliers of machinery.

Employers must record the significant findings of their risk assessment. They need to record in an action plan anything identified as being necessary to comply with the law, setting out what they have done and what they are going to do, with a timetable and saying who will be responsible for the work.

The risk assessment should be reviewed if circumstances in the workplace change and affect noise exposures. Also it should be reviewed regularly to make sure that the employer continues to do all that is reasonably practicable to control the noise risks. Even if it appears that nothing has changed, employers should not leave it for more than about 2 years without checking whether a review is needed.

15.24.4 Elimination or control of exposure – Regulation 6

The purpose of the Control of Noise at Work Regulations 2005 is to make sure that people do not suffer damage to their hearing – so efforts to controlling noise risks and noise exposure should be concentrated.

Wherever there is noise at work employers should be looking for alternative processes, equipment and/or working methods which would make the work quieter or mean people are exposed for shorter times. They should also be keeping up with what is good practice or the standard for noise control within their industry.

Where there are things that can be done to reduce risks from noise that are reasonably practicable, they should be done. However, where noise exposures are below the lower exposure action values, risks are low and so employers would only be expected to take actions which are relatively inexpensive and simple to carry out.

Where the assessment shows that employees are likely to be exposed at or above the upper exposure action values, employers must put in place a planned programme of noise control.

The risk assessment will have produced information on the risks and an action plan for controlling noise. Employers should use this information to:

- ▶ tackle the immediate risk, e.g. by providing hearing protection;

- ▶ identify what is possible to control noise, how much reduction could be achieved and what is reasonably practicable;
- ▶ establish priorities for action and a timetable (e.g. consider where there could be immediate benefits, what changes may need to be phased in over a longer period of time and the number of people exposed to the noise in each case);
- ▶ assign responsibilities to people to deliver the various parts of the plan;
- ▶ ensure the work on noise control is carried out;
- ▶ check that what has been done has worked.

Actions taken should be based on the general principles set out in the Management Regulations and should include consideration of:

- ▶ other working methods;
- ▶ choice of appropriate work equipment emitting the least possible noise;
- ▶ the design and layout of workplaces, workstations and rest facilities;
- ▶ suitable and sufficient information and training;
- ▶ reduction of noise by technical means;
- ▶ appropriate maintenance programmes;
- ▶ limitation of the duration and intensity of exposure;
- ▶ appropriate work schedules with adequate rest periods.

15.24.5 Hearing protection – Regulation 7

Hearing protection should be issued to employees:

- ▶ where extra protection is needed above what can be achieved using noise control;
- ▶ as a short-term measure while other methods of controlling noise are being developed.

Hearing protection should not be used as an alternative to controlling noise by technical and organisational means.

Employers should consult with their employees or their representatives on the type of hearing protection to be used.

Employers are required to:

- ▶ provide employees with hearing protectors if they ask for it and their noise exposure is between the lower and upper exposure action values;
- ▶ provide employees with hearing protectors and make sure they use them properly when their noise exposure exceeds the upper exposure action values;
- ▶ identify hearing protection zones, i.e. areas where the use of hearing protection is compulsory, and mark them with signs if possible. Restrict access to hearing protection zones where this is practicable and the noise exposure justifies it;
- ▶ provide employees with training and information on how to use and care for the hearing protectors;
- ▶ ensure that the hearing protectors are properly used and maintained.

15.24.6 Maintenance and use of equipment – Regulation 8

Employers need to make sure that hearing protection works effectively and to:

- ▶ check that all equipment provided in compliance with the regulations remains in good, clean condition and that there are no unofficial modifications;
- ▶ check that hearing protection is fully and properly used (except where it is provided for employees who are exposed at or above the lower exposure level but below the upper exposure level). This is likely to mean that an employer needs to:
 - ▶ put someone in authority in overall charge of issuing it and making sure replacements are readily available;
 - ▶ carry out spot checks to see that the rules are being followed and that hearing protection is being used properly;
 - ▶ ensure all managers and supervisors set a good example and wear hearing protection at all times when in hearing protection zones;
 - ▶ ensure only people who need to be there enter hearing protection zones and do not stay longer than they need to.

15.24.7 Health surveillance – Regulation 9

Employers must provide health surveillance (hearing checks) for all their employees who are likely to be regularly exposed above the upper exposure action values, or are at risk for any reason – for example they already suffer from hearing loss or are particularly sensitive to damage.

The purpose of health surveillance is to:

- ▶ warn when employees might be suffering from early signs of hearing damage;
- ▶ give employers an opportunity to do something to prevent the damage getting worse;
- ▶ check that control measures are working.

The trade union safety representative, or employee representative and the employees concerned, should be consulted before introducing health surveillance. It is important that employees understand that the aim of health surveillance is to protect their hearing. Employers will need their understanding and cooperation if health surveillance is to be effective.

Health surveillance for hearing damage usually means:

- ▶ regular hearing checks in controlled conditions;
- ▶ telling employees about the results of their hearing checks (required after reasonable notice by employee);
- ▶ keeping health records;
- ▶ ensuring employees are examined by a doctor where hearing damage is identified.

If the doctor considers the hearing damage is likely to be the result of exposure, the employer must:

- ▶ ensure that the employee is informed by a suitably qualified person;
- ▶ review the risk assessment and control measures;
- ▶ consider assigning the employee to alternative work;
- ▶ ensure continued surveillance.

15.24.8 Information, instruction and training – Regulation 10

Where employees are exposed to noise which is likely to be at or above the lower exposure level, suitable and sufficient information, instruction and training must be provided and kept up to date. This includes the nature of the risks, compliance action taken, significant findings of the risk assessment, hearing protection, how to detect and report signs of hearing damage, entitlement to health surveillance, safe working practices and collective results of health surveillance.

15.24.9 Further information

Control of Noise at Work Regulations 2005 (SI No. 154) <http://www.legislation.gov.uk/ukxi/2005/1643/content> made

Controlling Noise at Work. The Control of Noise At Work Regulations 2005, L108 (second edition), 2005. HSE Books, ISBN 978 0 7176 6164 0. <http://www.hse.gov.uk/pubns/books/1108.htm>

Noise Don't lose your hearing INDG363 (rev 2) 2012, HSE Books, ISBN 978 0 7176 6510 5. <http://www.hse.gov.uk/pubns/indg363.htm>

Noise at Work: a brief guide to controlling the risks INDG362 (rev 2), 2012, HSE Books, ISBN 978 0 7176 6482 5. <http://www.hse.gov.uk/pubns/indg362.htm>

Sound Advice: Control of noise at work in music and entertainment, HSG260, HSE Books, 2008, ISBN 978 0 7176 6307 1 <http://www.hse.gov.uk/pubns/priced/hsg260.pdf>

15.25 Personal Protective Equipment at Work Regulations 1992 as amended in 2002 and 2013

15.25.1 Introduction

The effect of the PPE at Work regulations is to ensure that certain basic duties governing the provision and use of PPE apply to all situations where PPE is required. The Regulations follow sound principles for the effective and economical use of PPE, which all employers should follow.

PPE, as defined, includes all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects them against one or more risks to their health and safety. Waterproof, weatherproof or

insulated clothing is covered only if its use is necessary to protect against adverse climatic conditions.

Ordinary working clothes and uniforms, which do not specifically protect against risks to health and safety, and protective equipment worn in sports' competitions, are not covered.

Where there is overlap in the duties in these Regulations and those covering lead, ionising radiations, asbestos, hazardous substances (COSHH), and noise then the specific legislative requirements should prevail. Construction head protection is now included within the scope of these regulations by a 2013 amendment and the revocation of the Construction (Head protection) Regulations.

15.25.2 Provision of PPE – Regulation 4

Every employer shall ensure that suitable PPE is provided to their employees who may be exposed to risks to their health and safety except where it has been adequately or more effectively controlled by other means. (Management Regulations require PPE to be the last choice in the principles of protection.)

PPE shall not be suitable unless:

- ▶ it is appropriate for the risks and the conditions of use including the period for which it is worn;
- ▶ it takes account of ergonomic requirements and the state of health of the wearer and the characteristics of the workstation of each person;
- ▶ it is capable of fitting the wearer correctly, by adjustments if necessary;
- ▶ it is, so far as is practicable, able to combat the risks without increasing overall risks;
- ▶ it complies with UK legislation on design or manufacture, i.e. it has a CE marking.

Where it is necessary that PPE is hygienic and otherwise free of risk to health, PPE must be provided to a person solely for their individual use.

15.25.3 Compatibility – Regulation 5

Where more than one health and safety risk necessitates the wearing of multiple PPE simultaneously then they shall be compatible and remain effective.

15.25.4 Assessment – Regulation 6

Before choosing any PPE, employers must ensure that an assessment is made to determine whether the PPE is suitable.

The assessment shall include:

- ▶ assessing risks which have not been avoided by other means;
- ▶ a definition of the characteristics that PPE must have to be effective, taking into account any risks created by the PPE itself;

- ▶ a comparison of available PPE with the required characteristics;
- ▶ information on whether the PPE is compatible with any other PPE which is in use, and which an employee would be required to wear simultaneously.

The assessment should be reviewed if it is no longer valid or there have been significant changes. In simple cases it will not be necessary to record the assessment but, in more complex cases, written records should be made and kept readily available for future reference.

15.25.5 Maintenance – Regulation 7

Every employer (and self-employed person) shall ensure that any PPE provided is maintained, including being replaced and cleaned, in an efficient state, in efficient working order and in good repair.

The guide emphasises the need to set up an effective system of maintenance for PPE. This should be proportionate to the risks and appropriate to the particular PPE. It could include, where appropriate, cleaning, disinfection, examination, replacement, repair and testing. For example, mechanical fall arrestor equipment or sub-aqua breathing apparatus will require planned preventative maintenance with examination, testing and overhaul. Records should be kept of the maintenance work. Gloves may only require periodic inspection by the user as necessary, depending on their use.

Spare parts must be compatible and be the proper part, suitably CE-marked where applicable. Manufacturers' maintenance schedules and instructions should be followed unless alternative schemes are agreed with the manufacturer or agent.

In some cases these requirements can be fulfilled by using disposable PPE which can be discarded after use or when their life has expired. Users should know when to discard and replace disposable PPE.

15.25.6 Accommodation – Regulation 8

When an employer or self-employed person has to provide PPE they must ensure that appropriate accommodation is provided to store it when not in use.

The type of accommodation will vary and may just be suitable hooks for special clothing and small portable cases for goggles. It should be separate from normal outer clothing storage arrangements and protect the PPE from contamination or deterioration.

15.25.7 Information, instruction and training – Regulation 9

Employers shall provide employees with adequate and appropriate information, instruction and training on:

- ▶ the risks which the PPE will avoid or limit;
- ▶ the purpose for which and the manner in which PPE should be used;

- ▶ any action required of the employee to maintain the PPE.

Employers must ensure that the information is kept available. The employer shall, where appropriate and at suitable intervals, organise demonstrations of the wearing of PPE. The guidance suggests the training should include:

- ▶ an explanation of the risks and why PPE is needed;
- ▶ the operation, performance and limitations of the equipment;
- ▶ instructions on the selection, use and storage of PPE;
- ▶ problems that can affect PPE relating to other equipment, working conditions, defective equipment, hygiene factors and poor fit;
- ▶ the recognition of defects and how to report problems with PPE;
- ▶ practice in putting on, wearing and removing PPE;
- ▶ practice in user cleaning and maintenance;
- ▶ how to store safely.

15.25.8 Use and reporting of defects – Regulations 10 and 11

Every employer shall take all reasonable steps to ensure that PPE is properly used.

Every employee shall:

- ▶ use PPE provided in accordance with training and instructions;
- ▶ return it to the accommodation provided after use;
- ▶ report any loss or obvious defect.

15.25.9 Further information

A Short Guide to the Personal Protective Equipment at Work Regulations 1992, INDG174(rev2), HSE Books, 2013, ISBN 978 0 7176 6141 1. www.hse.gov.uk/pubns/indg174.pdf

Hard hats: What you need to know as a busy builder. Construction Information Sheet CIS70, HSE Books, 2013, www.hse.gov.uk/pubns/cis70.pdf

Personal Protective Equipment (EC Directive) Regulations 2002. SI 2002 No. 1144, <http://www.legislation.gov.uk/ukSI/2002/1144/contents/made>

Personal Protective Equipment at Work. Personal Protective Equipment at Work Regulations 1992. Guidance on Regulations. L25 (second edition), HSE Books, 2005, ISBN 978 0 7176 6139 8. <http://www.hse.gov.uk/pubns/books/l25.htm>

Selecting Protective Gloves for Work with Chemicals. Guidance for Employers and Health and Safety Specialists INDG330, HSE Books, 2000, www.hse.gov.uk/pubns/indg330.htm

Sun Protection Advice for Employers of Outdoor Workers INDG337, HSE Books, 2001, ISBN 978 0 7176 1982 5. <http://www.hse.gov.uk/pubns/indg337.pdf>

15.26 Provision and Use of Work Equipment Regulations 1998 (except Part IV) as amended in 2002 and 2013

15.26.1 Introduction

The PUWER Regulations 1998 are made under the HSW Act and their primary aim is to ensure that work equipment is used without risks to health and safety, regardless of its age, condition or origin. The requirements of PUWER that are relevant to woodworking machinery are set out in the Safe Use of Woodworking Machinery Approved Code of Practice. PUWER has specific requirements for risk assessment which are covered under the Health and Safety Management Regulations 1999.

Part IV of PUWER is concerned with power presses and is not part of the Certificate syllabus, and is therefore not covered in this summary.

15.26.2 Definitions

Work equipment means any machinery, appliance, apparatus, tool or installation for use at work.

Use in relation to work equipment means any activity involving work equipment and includes starting, stopping, programming, setting, transporting, repairing, modifying, maintaining, servicing and cleaning.

15.26.3 Duty-holders – Regulation 3

Under PUWER the following groups of people have duties placed on them:

- ▶ employers;
- ▶ the self-employed;
- ▶ people who have control of work equipment, for example plant hire companies.

In addition to all places of work, the Regulations apply to common parts of shared buildings, industrial estates and business parks; to temporary works sites including construction; to home working (but not to domestic work in a private household); to hotels, hostels and sheltered accommodation.

15.26.4 Suitability of work equipment – Regulation 4

Work equipment:

- ▶ has to be constructed or adapted so that it is suitable for its purpose;
- ▶ has to be selected with the conditions of use and the users' health and safety in mind;
- ▶ may only be used for operations for which, and under conditions for which, it is suitable.

This covers all types of use and conditions and must be considered for each particular use or condition. For example, scissors may be safer than knives with unprotected blades and should therefore be used for

cutting operations where practicable; risks imposed by wet, hot or cold conditions must be considered.

15.26.5 Maintenance – Regulation 5

The Regulation sets out the general requirement to keep work equipment maintained in:

- ▶ an efficient state,
- ▶ efficient working order,
- ▶ good repair.

Compliance involves all three criteria. In addition, where there are maintenance logs for machinery, they must be kept up to date.

In many cases this will require routine and planned preventative maintenance of work equipment. When checks are made priority must be given to:

- ▶ safety;
- ▶ operating efficiency and performance;
- ▶ the equipment's general condition.

15.26.6 Inspection – Regulation 6

Where the safety of work equipment depends on the installation conditions, it must be inspected:

- ▶ after installation and before being put into service for the first time;
- ▶ after assembly at a new site or in a new location;
- ▶ to ensure that it has been installed correctly and is safe to operate.

Where work equipment is exposed to conditions causing deterioration which is liable to result in dangerous situations, it must be inspected:

- ▶ at suitable intervals;
- ▶ when exceptional circumstances occur.

Inspections must be determined and carried out by competent persons. An inspection will vary from a simple visual external inspection to a detailed comprehensive inspection which may include some dismantling and/or testing. However, the level of inspection would normally be less than that required for a thorough examination under, for example, LOLER, for certain items of lifting equipment.

Records of inspections must be kept with sufficient information to properly identify the equipment, its normal location, dates, faults found, action taken, to whom faults were reported, who carried out the inspection, when repairs were made, date of the next inspection.

When equipment leaves an employer's undertaking it must be accompanied by physical evidence that the last inspection has been carried out.

15.26.7 Specific risks – Regulation 7

Where the use of work equipment involves specific hazards, its use must be restricted to those persons given the specific task of using it, and repairs, etc. must be restricted to designated persons.

Designated persons must be properly trained to fulfil their designated task.

The ACoP requires that hazards must be controlled using a hierarchy of control measures, starting with elimination where this is possible, then considering hardware measures such as physical barriers and, lastly, software measures such as a safe system of work.

15.26.8 Information, instruction and training – Regulations 8 and 9

Persons who use work equipment must have adequate:

- ▶ health and safety information;
- ▶ where appropriate, written instructions about the use of the equipment;
- ▶ training for health and safety in methods which should be adopted when using the equipment, and for any hazards and precaution which should be taken to reduce risks.

Any persons who supervise the use of work equipment should also receive information, instruction and training. The training of young persons is especially important with the need for special risk assessments under the Management of Health and Safety at Work Regulations.

Health and safety training should take place within working hours.

15.26.9 Conformity with Community requirements – Regulation 10

The intention of this Regulation is to require that employers ensure that equipment, provided for use after 31 December 1992, conforms at all times with the relevant essential requirements in various European Directives made under Article 100A (now 95) of the Treaty of Rome. The requirements of PUWER 98 Regulations 11–19 and 22–29 only apply if the essential requirements do not apply to a particular piece of equipment.

However, PUWER Regulations 11–19 and 22–29 will apply if:

- ▶ they include requirements which were not included in the relevant product legislation;
- ▶ the relevant product legislation has not been complied with (e.g. the guards fitted on a machine when supplied were not adequate).

Employers using work equipment need to check that any new equipment has been made to the requirements of the relevant Directive, and has a CE marking, suitable instructions and a Certificate of Conformity.

The Machinery Directive was brought into UK law by the Supply of Machinery (Safety) Regulations 1992 as amended, which duplicate PUWER Regulations 11–19 and 22–29. On 29 December 2009 these regulations were replaced by the 2008 Regulations.

The employer still retains the duty to ensure that the equipment is safe to use.

15.26.10 Dangerous parts of machinery – Regulation 11

Measures have to be taken which:

- ▶ prevent access to any dangerous part of machinery or to any rotating stock-bar;
- ▶ stop the movement of any dangerous part of machinery or rotating stock-bar before any person enters a danger zone.

The measures required follow the normal hierarchy and should be considered to the extent that they are practicable in each case. They consist of:

- ▶ the provision of fixed guards enclosing every dangerous part of machinery; then
- ▶ the provision of other guards or protection devices; then
- ▶ the provision of jigs, holders, push-sticks or similar protection appliances used in conjunction with the machinery; then
- ▶ the provision of information, instruction, training and supervision as is necessary.

All guards and protection devices shall:

- ▶ be suitable for their purpose;
- ▶ be of good construction, sound material and adequate strength;
- ▶ be maintained in an efficient state, in efficient working order and in good repair;
- ▶ not give rise to increased risks to health and safety;
- ▶ not be easily bypassed or disabled;
- ▶ be situated at sufficient distance from the danger zone;
- ▶ not unduly restrict the view of the operating cycle of the machine where this is relevant;
- ▶ be so constructed or adapted that they allow operations necessary to fit or replace parts and for maintenance work, if possible without having to dismantle the guard or protection device.

15.26.11 Protection against specified hazards – Regulation 12

Exposure to health and safety risks from the following hazards must be prevented or adequately controlled:

- ▶ any article falling or being ejected from work equipment;
- ▶ rupture or disintegration of work equipment;
- ▶ work equipment catching fire or overheating;
- ▶ the unintended or premature discharge of any article, or of any gas, dust, liquid, vapour or other substance which is produced, used or stored in the work equipment;
- ▶ the unintended or premature explosion of the work equipment or any article or substance produced, used or stored in it.

15.26.12 High or very low temperature – Regulation 13

Work equipment and any article or substance produced, used or stored in work equipment which is at a high or very low temperature must have protection to prevent injury by burn, scald or sear.

This does not cover risks such as from radiant heat or glare.

Engineering methods of control such as insulation, doors, temperature control guards, should be used where practicable but there are some cases, like cooker hot plates, where this is not possible.

15.26.13 Controls – Regulations 14-16

Where work equipment is provided with (Regulation 14):

- ▶ starting controls (including restarting after a stoppage); and
- ▶ controls which change speed, pressure or other operating condition which would affect health and safety;

it should not be possible to perform any operation except by a deliberate action on the control. This does not apply to the normal operating cycle of an automatic device.

Where appropriate, one or more readily accessible **stop controls** shall be provided to bring the work equipment to a safe condition in a safe manner (Regulation 15).

They must:

- ▶ bring the work equipment to a complete stop where necessary;
- ▶ if necessary, switch off all sources of energy after stopping the functioning of the equipment;
- ▶ operate in priority to starting or operating controls.

Where appropriate, one or more readily accessible **emergency stop controls** (Regulation 16) must be provided unless it is not necessary:

- ▶ by the nature of the hazard;
- ▶ by the time taken for the stop controls to bring the equipment to a complete stop.

Emergency stop controls must have priority over stop controls. They should be provided where other safeguards are not adequate to prevent risk when something irregular happens. They should not be used as a substitute for safeguards or the normal method of stopping the equipment.

All controls for work equipment shall (Regulation 17):

- ▶ be clearly visible and identifiable including appropriate marking where necessary;
- ▶ not expose any person to a risk to their health and safety except where necessary.

Where appropriate, employers shall ensure that:

- ▶ controls are located in a safe place;
- ▶ systems of work are effective in preventing any person being in a danger zone when equipment is started;

an audible, visible or other suitable warning is given whenever work equipment is about to start.

Persons in a danger zone as a result of starting or stopping equipment must have sufficient time and suitable means to avoid any risks.

Control systems (Regulation 18) must be safe and chosen so as to allow for failures, faults and constraints. They must:

- ▶ not create any increased risk to health and safety;
- ▶ not result in additional or increased risks when failure occurs;
- ▶ not impede the operation of any stop or emergency stop controls.

15.26.14 Isolation from sources of energy – Regulation 19

Work equipment must be provided with readily accessible and clearly identified means to isolate it from all sources of energy. Re-connection must not expose any person using the equipment to any risks.

The main purpose is to allow equipment to be made safe under particular circumstances, such as maintenance, when unsafe conditions occur, or when adverse conditions such as electrical equipment in a flammable atmosphere or wet conditions occur.

If isolation may cause a risk in itself, special precautions must be taken – for example a support for a hydraulic press tool which could fall under gravity if the system is isolated.

15.26.15 Stability – Regulation 20

Work equipment must be stabilised by clamping or otherwise as necessary to ensure health and safety.

Most machines used in a fixed position should be bolted or fastened so that they do not move or rock in use.

15.26.16 Lighting – Regulation 21

Suitable and sufficient lighting, taking account of the operations being carried out, must be provided where people use work equipment.

This will involve general lighting and in many cases local lighting, such as on a sewing machine. If access for maintenance is required regularly, permanent lighting should be considered.

15.26.17 Maintenance operations – Regulation 22

So far as is reasonably practicable, work equipment should be constructed or adapted to allow maintenance operations to be:

- ▶ conducted while it is shut down;
- ▶ undertaken without exposing people to risk;
- ▶ carried out after appropriate protection measures have been taken.

15.26.18 Markings and warnings – Regulations 23 and 24

Work equipment should have all appropriate **markings** for reasons of health and safety made in a clearly visible manner – for example the maximum safe working load, stop and start controls, or the maximum rotation speed of an abrasive wheel.

Work equipment must incorporate **warnings** or **warning devices** as appropriate, which are unambiguous, easily perceived and easily understood.

They may be incorporated in systems of work, a notice, a flashing light or an audible warning. They are an active instruction or warning to take specific precautions or actions when a hazard exists.

15.26.19 Part III: mobile work equipment – Regulations 25–30

The main purpose of this section is to require additional precautions relating to work equipment while it is travelling from one location to another or where it does work while moving. If the equipment is designed primarily for travel on public roads, the Road Vehicles (Construction and Use) Regulations 1986 will normally be sufficient to comply with PUWER 98.

Mobile equipment would normally move on wheels, tracks, rollers, skids, etc. Mobile equipment may be self-propelled, towed or remote controlled and may incorporate attachments. Pedestrian-controlled work equipment such as lawn mowers is not covered by Part III.

Employees carried on mobile work equipment – Regulation 25

No employee may be carried on mobile work equipment unless:

- ▶ it is suitable for carrying persons;
- ▶ it incorporates features to reduce risks as low as is reasonably practicable, including risks from wheels and tracks.

Rolling over of mobile work equipment – Regulation 26

Where there is a risk of overturning it must be minimised by:

- ▶ stabilising the equipment;
- ▶ fitting a structure so that it only falls on its side (tip over protection structure such as the vertical mast of a fork-lift truck);
- ▶ fitting a structure which gives sufficient clearance for anyone being carried if it turns over further (rollover protective structures – ROPS);
- ▶ a device giving comparable protection;
- ▶ fitting a suitable restraining system for people if there is a risk of being crushed by rolling over.

This Regulation does not apply:

- ▶ to a fork-lift truck fitted with ROPS or vertical mast which prevents it turning on its side;
- ▶ where it would increase the overall risks;
- ▶ where it would not be reasonably practicable to operate equipment;
- ▶ to any equipment provided for use before 5 December 1998.

Overtuning of fork-lift trucks – Regulation 27

Fork-lift trucks which carry an employee must be adapted or equipped to reduce the risk to safety from overturning to as low as is reasonably practicable.

Self-propelled work equipment – Regulation 28

Where self-propelled work equipment may involve risks while in motion, it shall have:

- ▶ facilities to prevent unauthorised starting;
- ▶ (with multiple rail-mounted equipment) facilities to minimise the consequences of collision;
- ▶ a device for braking and stopping;
- ▶ (where safety constraints so require) emergency facilities for braking and stopping, in the event of failure of the main facility, which have readily accessible or automatic controls;
- ▶ (where the driver's vision is inadequate) devices fitted to improve vision;
- ▶ (if used at night or in dark places) appropriate lighting fitted or otherwise it shall be made sufficiently safe for its use;
- ▶ if there is anything carried or towed that constitutes a fire hazard liable to endanger employees (particularly if escape is difficult such as from a tower crane), appropriate fire-fighting equipment carried, unless it is sufficiently close by.

Remote-controlled self-propelled work equipment – Regulation 29

Where remote-controlled self-propelled work equipment involves a risk while in motion it shall:

- ▶ stop automatically once it leaves its control range;
- ▶ have features or devices to guard against the risk of crushing or impact.

Drive shafts – Regulation 30

Where seizure of the drive shaft between mobile work equipment and its accessories or anything towed is likely to involve a risk to safety:

- ▶ the equipment must have means to prevent a seizure;
- ▶ where it cannot be avoided, every possible measures should be taken to avoid risks;

- ▶ the shaft should be safeguarded from contacting the ground and becoming soiled or damaged.

15.26.20 Part IV – power presses

Regulations 31–35 relate to power presses and are not included here as they are excluded from the NEBOSH Certificate syllabus. Details can be found in the Power Press ACoP.

15.26.21 Further information

Hiring and Leasing Out of Plant: Application of PUWER 98, Regulations 26 and 27, HSE MISC156, 1998, HSE Books, www.hse.gov.uk/pubns/9204.pdf

Providing and using work equipment safely: A brief guide, INDG291 (rev1), HSE Books, 2013, ISBN 978 0 7176 2429 4. <http://www.hse.gov.uk/pubns/indg291.pdf>

Provision and Use of Work Equipment Regulations 1992, SI 1992 No. 2932.

<http://www.legislation.gov.uk/uk/si/1998/2306/regulation/12/made>

PUWER 1998, Provision and Use of Work Equipment Regulations 1998: Open Learning Guidance, HSE Books, 2008, ISBN 978 0 7176 6285 2. <http://www.hse.gov.uk/pubns/books/puwer.htm>

Retrofitting of Roll-over Protective Structures, Restraining Systems and Their Attachment Points to Mobile Work Equipment MISC175, HSE Books, 1999, <http://www.hse.gov.uk/pubns/misc175.pdf>

Safe use of woodworking machinery. Provision and Use of Work Equipment Regulations 1998 as applied to woodworking machinery. Approved Code of Practice and guidance L114 (2nd Edition) HSE Books, 2014, ISBN 978 0 7176 6621 8 www.hse.gov.uk/pubns/books/l114.htm

Safe Use of Work Equipment, Provision and Use of Work Equipment Regulations 1998, Approved Code of Practice and Guidance, HSC L22 (4th Edition), HSE Books, 2014, ISBN 978 0 7176 6619 5. <http://www.hse.gov.uk/pubns/books/l22.htm>

The selection and management of mobile elevating work platforms, HSE information sheet, 2014, GEIS6. <http://www.hse.gov.uk/pubns/geis6.htm>

Using Work Equipment Safely INDG229 (rev2), 2012, HSE Books, <http://www.hse.gov.uk/pubns/indg229.pdf>

15.27 The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013

15.27.1 Introduction

RIDDOR is the law that requires employers, and other people who are in control of work premises, to report and keep records of:

- ▶ work-related deaths;
- ▶ certain serious injuries (reportable injuries);

- ▶ diagnosed cases of certain industrial diseases; and
- ▶ certain 'dangerous occurrences' (near-miss incidents).

These new RIDDOR Regulations came into force on 1 October 2013.

The main changes are to simplify the reporting requirements in the following areas:

- ▶ The classification of 'major injuries' to workers is being replaced with a shorter list of 'specified injuries'.
- ▶ The previous list of 47 types of industrial disease is being replaced with eight categories of reportable work-related illness.
- ▶ Fewer types of 'dangerous occurrence' require reporting.

There are no significant changes to the reporting requirements for:

- ▶ Fatal accidents.
- ▶ Accidents to non-workers (members of the public).
- ▶ Accidents which result in the incapacitation of a worker for more than seven days.

Recording requirements remain broadly unchanged, including the requirement to record accidents resulting in the incapacitation of a worker for more than three days.

15.27.2 Definitions – Regulation 2

Accident includes an act of non-consensual physical violence done to a person at work.

Dangerous occurrence means an occurrence which arises out of or in connection with work and is of a class specified in Schedule 2 of the regulations.

Reportable incident means an incident giving rise to a notification or reporting requirement under these Regulations.

Disease includes a medical condition.

For the purposes of RIDDOR, an accident is a separate, identifiable, unintended incident that causes physical injury. This specifically includes acts of non-consensual violence to people at work.

Not all accidents need to be reported; a RIDDOR report is required only when:

- ▶ the accident is **work-related**; and
- ▶ it results in an injury of a type which is **reportable** (Regulations 4, 5 and 6).

Examples of incidents that do and do not have to be reported are available at www.hse.gov.uk/riddor/do-i-need-to-report.htm

15.27.3 Responsible person

Reports under the RIDDOR Regulations should only be submitted by the **responsible person**, such as employers, the self-employed, and those in control of premises where incidents occur as follows:

Employers must report any work-related deaths, and certain work-related injuries, cases of disease, and near misses involving your employees wherever they are working.

Persons in control of premises, must report any work-related deaths, certain injuries to members of the public and self-employed people on their premises, and dangerous occurrences (some near miss incidents) that occur on their premises.

Self-employed if working in someone else's work premises and suffer either a specified injury or an over-seven-day injury, then **the person in control of the premises** will be responsible for reporting. If a self-employed person has a reportable accident while working on their own premises or in domestic premises, or if a doctor tells them that they have a work-related disease or condition, then the **self-employed** person will need to report it.

Employment Agencies are often the legal employer and are responsible for reporting like any other employer. In other cases such as self-employed people, the duty is on the host business. Agents should ensure that responsibilities under RIDDOR are clearly assigned.

There are special cases for mines, quarries, pipelines and wells (other than a water well).

15.27.4 Non-fatal injuries to workers – Regulation 4

Specified Injuries

Responsible persons must follow the reporting procedures where as a result of a work-related accident a person at work suffers a specified injury. The list of 'specified injuries' in RIDDOR 2013 (Regulation 4) includes:

- ▶ a fracture, other than to fingers, thumbs and toes;
- ▶ amputation of an arm, hand, finger, thumb, leg, foot or toe;
- ▶ permanent loss of sight or reduction of sight;
- ▶ crush injuries leading to internal organ damage;
- ▶ any burns (covering more than 10% of the body, or damaging the eyes, respiratory system or other vital organs);
- ▶ scalplings (separation of skin from the head) which require hospital treatment;
- ▶ unconsciousness caused by head injury or asphyxia;
- ▶ any other injury arising from working in an enclosed space, which leads to hypothermia, heat-induced illness or requires resuscitation or admittance to hospital for more than 24 hours.

Over seven-day incapacitation of a worker

Accidents must be reported where they result in an employee or self-employed person being away from work, or unable to perform their normal work duties, for more than **seven** consecutive days as the result of their

injury. This seven-day period does not include the day of the accident, but does include weekends and rest days. The responsible person must send a report in an approved manner, within 15 days of the accident.

15.27.5 Non-fatal injuries to non-workers – Regulation 5

Accidents to members of the public or others who are not at work must be reported if they result in an **injury** and the person is taken directly from the scene of the accident to hospital for treatment to that injury. Examinations and diagnostic tests do not constitute 'treatment' in such circumstances.

If the accident occurred at a hospital, the report only needs to be made if the injury is a 'specified injury'.

15.27.6 Work-related fatalities – Regulation 6

Where any person dies (up to a year after the date of the accident, regardless of whether it was reported at the time) as a result of a work-related accident or occupational exposure to a biological agent, the responsible person must report the death.

This does not apply to a self-employed person working on their own premises, although other reporting requirements to the police are likely to apply.

15.27.7 Dangerous occurrences

There are 27 categories of dangerous occurrences which must be reported by the responsible person following the procedure.

The list from **Schedule 2 Part 1 – General** is as follows:

Lifting machinery, etc.

1. The collapse, overturning, or the failure of any load-bearing part of lifts and lifting equipment.

Pressure systems

2. The failure of any closed vessel or of any associated pipe-work (other than a pipeline), forming part of a pressure system as defined by the Pressure Systems Safety Regulations 2000, where that failure could cause the death of any person.

Overhead electric lines

3. Any plant or equipment unintentionally coming into –
 - (a) contact with an uninsulated overhead electric line in which the voltage exceeds 200 volts; or
 - (b) close proximity with such an electric line, such that it causes an electrical discharge.

Electrical incidents causing explosion or fire

4. Any explosion or fire caused by an electrical short circuit or overload (including those resulting from accidental damage to the electrical plant) which either –
 - (a) results in the stoppage of the plant involved for more than 24 hours; or
 - (b) causes a significant risk of death.

Explosives

5. Any unintentional –

- (a) fire, explosion or ignition at a site where the manufacture or storage of explosives requires a licence or registration, as the case may be, under Regulation 9, 10 or 11 of the Manufacture and Storage of Explosives Regulations 2005; or
 - (b) explosion or ignition of explosives (unless caused by the unintentional discharge of a weapon, where, apart from that unintentional discharge, the weapon and explosives functioned as they were designed to), except where a fail-safe device or safe system of work prevented any person being endangered as a result of the fire, explosion or ignition.
6. The misfire of explosives (other than at a mine or quarry, inside a well or involving a weapon) except where a fail-safe device or safe system of work prevented any person being endangered as a result of the misfire.
 7. Any explosion, discharge or intentional fire or ignition which causes any injury to a person requiring first-aid or medical treatment, other than at a mine or quarry.
 8.
 - (1) The projection of material beyond the boundary of the site on which the explosives are being used, or beyond the danger zone of the site, which caused or might have caused injury, except at a quarry.
 - (2) In this paragraph, 'danger zone' means the area from which persons have been excluded or forbidden to enter to avoid being endangered by any explosion or ignition of explosives.
 9. The failure of shots to cause the intended extent of collapse or direction of fall of a structure in any demolition operation.

Biological agents

10. Any accident or incident which resulted, or could have resulted, in the release or escape of a biological agent likely to cause severe human infection or illness.

Malfunction of radiation generators and radiography

11.
 - (1) The malfunction of –
 - (a) a radiation generator or its ancillary equipment used in fixed or mobile industrial radiography, the irradiation of food or the processing of products by irradiation, which causes it to fail to de-energise at the end of the intended exposure period;
 - (b) equipment used in fixed or mobile industrial radiography or gamma irradiation, which causes a radioactive source to fail to return to its safe position by the normal means at the end of the intended exposure period.

- (2) In this paragraph, 'radiation generator' means any electrical equipment emitting ionising radiation and containing components operating at a potential difference of more than 5kV.

Breathing apparatus

12. The malfunction of breathing apparatus –
- where the malfunction causes a significant risk of personal injury to the user; or
 - during testing immediately prior to use, where the malfunction would have caused a significant risk to the health and safety of the user had it occurred during use, other than at a mine.

Diving operations

13. The failure, damaging or endangering of –
- any life support equipment, including control panels, hoses and breathing apparatus; or
 - the dive platform, or any failure of the dive platform to remain on station, which causes a significant risk of personal injury to a diver.
14. The failure or endangering of any lifting equipment associated with a diving operation.
15. The trapping of a diver.
16. Any explosion in the vicinity of a diver.
17. Any uncontrolled ascent or any omitted decompression which causes a significant risk of personal injury to a diver.

Collapse of scaffolding

18. The complete or partial collapse (including falling, buckling or overturning) of –
- a substantial part of any scaffold more than 5 metres in height;
 - any supporting part of any slung or suspended scaffold which causes a working platform to fall (whether or not in use); or
 - any part of any scaffold in circumstances such that there would be a significant risk of drowning to a person falling from the scaffold.

Train collisions

19. The collision of a train with any other train or vehicle, other than a collision reportable under Part 5 of this Schedule, which could have caused the death, or specified injury, of any person.

Wells

20. In relation to a well (other than a well sunk for the purpose of the abstraction of water) –
- a blow-out (which includes any uncontrolled flow of well-fluids from a well);
 - the coming into operation of a blow-out prevention or diversion system to control flow of well-fluids where normal control procedures fail;
 - the detection of hydrogen sulphide at a well or in samples of well-fluids where the responsible person did not anticipate its presence in the reservoir drawn on by the well;

- the taking of precautionary measures additional to any contained in the original drilling programme where a planned minimum separation distance between adjacent wells was not maintained; or
- the mechanical failure of any part of a well whose purpose is to prevent or limit the effect of the unintentional release of fluids from a well or a reservoir being drawn on by a well, or whose failure would cause or contribute to such a release.

Pipelines or pipeline works

21. In relation to a pipeline or pipeline works –
- any damage to, accidental or uncontrolled release from or inrush of anything into a pipeline;
 - the failure of any pipeline isolation device, associated equipment or system; or
 - the failure of equipment involved with pipeline works, which could cause personal injury to any person, or which results in the pipeline being shut down for more than 24 hours.
22. The unintentional change in position of a pipeline, or in the subsoil or seabed in the vicinity, which requires immediate attention to safeguard the pipeline's integrity or safety.

Part 2 Dangerous Occurrences Reportable Except In Relation To An Offshore Workplace

Structural collapse

23. The unintentional collapse or partial collapse of –
- any structure, which involves a fall of more than 5 tonnes of material; or
 - any floor or wall of any place of work, arising from, or in connection with, ongoing construction work (including demolition, refurbishment and maintenance), whether above or below ground.
24. The unintentional collapse or partial collapse of any falsework.

Explosion or fire

25. Any unintentional explosion or fire in any plant or premises which results in the stoppage of that plant, or the suspension of normal work in those premises, for more than 24 hours.

Release of flammable liquids and gases

26. The sudden, unintentional and uncontrolled release –
- inside a building:
 - of 100 kilograms or more of a flammable liquid;
 - of 10 kilograms or more of a flammable liquid at a temperature above its normal boiling point;
 - of 10 kilograms or more of a flammable gas; or
 - in the open air, of 500 kilograms or more of a flammable liquid or gas.

Hazardous escapes of substances

27. The unintentional release or escape of any substance which could cause personal injury to any person other than through the combustion of flammable liquids or gases.

Additional categories of dangerous occurrences apply to mines, quarries, relevant transport systems and offshore workplaces.

15.27.8 Reporting of cases of disease and occupational exposure – Regulations 8 and 9

Where a medical practitioner notifies the employer's responsible person that an employee suffers from a reportable work-related disease (i.e. receives a diagnosis), a completed disease report form (F2508A) should be sent to the enforcing authority. The full list is as follows:

- Carpal Tunnel Syndrome, where the person's work involves regular use of percussive or vibrating tools;
- cramp in the hand or forearm, where the person's work involves prolonged periods of repetitive movement of the fingers, hand or arm;
- occupational dermatitis, where the person's work involves significant or regular exposure to a known skin sensitiser or irritant;
- Hand-Arm Vibration Syndrome, where the person's work involves regular use of percussive or vibrating tools, or the holding of materials which are subject to percussive processes, or processes causing vibration;
- occupational asthma, where the person's work involves significant or regular exposure to a known respiratory sensitiser; or
- tendonitis or tenosynovitis in the hand or forearm, where the person's work is physically demanding and involves frequent, repetitive movements.

For exposure to carcinogens, mutagens and biological agents:

- any cancer attributed to an occupational exposure to a known human carcinogen or mutagen (including ionising radiation), or
- any disease attributed to an occupational exposure to a biological agent.

Diseases offshore have separate criteria in Schedule 3 to the Regulations.

15.27.9 Gas incidents – Regulation 11

Distributors, fillers, importers and suppliers of flammable gas must report incidents where someone has died, lost consciousness, or been taken to hospital for treatment to an injury arising in connection with that gas. Such incidents should be reported using the online form.

Registered gas engineers (under the Gas Safe Register) must provide details of any gas appliances or fittings that they consider to be dangerous, to such an extent that people could die, lose consciousness or require

hospital treatment. The danger could be due to the design, construction, installation, modification or servicing of that appliance or fitting, which could cause:

- ▶ an accidental leakage of gas;
- ▶ inadequate combustion of gas; or
- ▶ inadequate removal of products of the combustion of gas.

Unsafe gas appliances and fittings should be reported using the online form.

15.27.10 Recording and record-keeping – Regulation 12

A record of each incident reported (deaths, specified injuries, over 7-day incapacitations and dangerous occurrences) and each diagnosis received of a reportable disease or exposure must be kept at the place of business.

In addition records must be kept of **over 3-day** incapacitations.

Where an employer must keep an accident book under the Social Security (Claims and Payments) Regulations 1979, that record will be enough for the accident records. Records must be kept for at least 3 years.

15.27.11 Restrictions on reporting – Regulation 14

Reports are not required under RIDDOR in relation to the following:

Accidents during medical or dental treatment, or during any examination carried out or supervised by a doctor or dentist.

Accidents involving the movement of a vehicle on a public road (other than those associated with loading or unloading operations; work alongside the road such as road maintenance; escapes of substances from the vehicle; and accidents involving trains).

Accidents to members of the armed forces on duty.

Reports are not required under RIDDOR where this would duplicate other similar reporting requirements as listed. These include reports required under:

- Nuclear Installations Act 1965;
- Merchant Shipping Act 1988;
- Ionising Radiations Regulations 1999;
- Civil Aviation (Investigation of Military Air Accidents at Civil Aerodromes) Regulations 2005;
- Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 1996;
- The Electricity Safety, Quality and Continuity Regulations 2002.

15.27.12 Reporting and recording procedures – Schedule 1

For most types of incident, including:

- ▶ accidents resulting in the **death** of any person,

- ▶ accidents resulting in **specified injuries** to workers;
- ▶ non-fatal accidents requiring hospital treatment to **non-workers**; and
- ▶ **dangerous occurrences**

the responsible person must notify the enforcing authority without delay, in accordance with the reporting procedure (Schedule 1). This is most easily done by reporting online at: <http://www.hse.gov.uk/riddor/report.htm#online>.

Alternatively, for **fatal accidents and specified injuries only**, the responsible person can telephone the Incident Contact Centre on 0845 300 9923 (opening hours Monday to Friday 8.30 a.m. to 5 p.m.).

A report must be received within **10 days** of the incident.

For accidents resulting in the over seven-day incapacitation of a worker, the responsible person must notify the enforcing authority within **fifteen days** of the incident, using the appropriate online form F2508IE.

Cases of occupational disease, including those associated with exposure to carcinogens, mutagens or biological agents should be reported as soon as the responsible person receives a diagnosis, using the appropriate online form F2508AE at: <https://extranet.hse.gov.uk/ffserver/external/F2508AE>.

There is no longer a paper form for RIDDOR reporting, since the online system is the preferred reporting mechanism. Should it be essential for the responsible person to submit a report by post, it should be sent to: RIDDOR Reports, Health and Safety Executive, Redgrave Court, Merton Road, Bootle, Merseyside, L20 7HS.

The HSE has an out-of-hours duty officer. Circumstances where the HSE may need to respond out of hours include:

- ▶ a work-related death or situation where there is a strong likelihood of death following an incident at, or connected with, work;
- ▶ a serious accident at a workplace so that the HSE can gather details of physical evidence that would be lost with time; and
- ▶ following a major incident at a workplace where the severity of the incident, or the degree of public concern, requires an immediate public statement from either the HSE or government ministers.

If the incident fits these descriptions ring the duty officer on 0151 922 9235. Further information about contacting the HSE out of hours can be found at www.hse.gov.uk/contact/outofhours.htm

15.27.13 Further information

Accident book BI510 (2nd Edition), HSE Books, 2012, ISBN 978 0 7176 6458 0 www.hse.gov.uk/pubns/books/accident-book.htm

HSE website for RIDDOR: <http://www.hse.gov.uk/riddor/>
Reporting accidents and incidents at work: A brief guide to RIDDOR INDG453(rev1), 2013, HSE Books, <http://www.hse.gov.uk/pubns/indg453-rev1.pdf>

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013, SI 2013, No1471, <http://www.legislation.gov.uk/uk/si/2013/1471/contents/made>

15.28 Safety Representatives and Safety Committees Regulations 1977

These Regulations, made under the HSW Act Section 2(4), prescribe the cases in which recognised trade unions may appoint safety representatives, specify the functions of such representatives and set out the obligations of employers towards them.

Employers' obligations to consult non-union employees are contained in the Health and Safety (Consultation with Employees) Regulations 1996.

15.28.1 Appointment – Regulation 3

A recognised trade union may appoint safety representatives from among employees in all cases where one or more employees are employed. When the employer is notified in writing the safety representatives have the functions set out in Regulation 4.

A person ceases to be a safety representative when:

- ▶ the appointment is terminated by the trade union,
- ▶ they resign,
- ▶ employment ceases.

A safety representative should have been with the employer for 2 years or have worked in similar employment for at least 2 years.

15.28.2 Functions – Regulation 4

These are functions and not duties. They include:

- ▶ representing employees in consultation with the employer;
- ▶ investigating potential hazards and dangerous occurrences;
- ▶ investigating the causes of accidents (*Note: re accident book BI510 and Data Protection – if the injured person has ticked the box and signed the form the safety representative may see all details. If not the employer should conceal the injured person's identity and details when giving access to the safety representatives*);
- ▶ investigating employee complaints relating to health, safety and welfare;
- ▶ making representations to the employer on health, safety and welfare matters;
- ▶ carrying out inspections;
- ▶ representing employees at the workplace in consultation with enforcing inspectors;
- ▶ receiving information;
- ▶ attending safety committee meetings.

Safety representatives must be afforded time off with pay to fulfil these functions and to undergo training.

15.28.3 Employers' duties – Regulation 4a

Every employer shall consult safety representatives in good time regarding:

- ▶ the introduction of any measure which may affect health and safety;
- ▶ the arrangements for appointing or nominating competent person(s) under the Management Regulations;
- ▶ any health and safety information required for employees;
- ▶ the planning and organising of any health and safety training for employees;
- ▶ the health and safety consequences of introducing new technology.

Employers must provide such facilities and assistance as safety representatives may reasonably require to carry out their functions.

15.28.4 Inspections – Regulations 5 and 6

Following reasonable notice in writing, safety representatives may inspect the workplace every quarter (or more frequently by agreement with the employer). They may inspect the workplace at any time, after consultation, when there have been substantial changes in the conditions of work or there is new information on workplace hazards published by the HSE.

Following an injury, disease or dangerous occurrence subject to Reporting of Injuries Diseases and Dangerous Occurrences Regulations, and after notifying the employer, where it is reasonably practicable to do so, safety representatives may inspect the workplace if it is safe.

Employers must provide reasonable assistance and facilities, including provision for independent investigation and private discussion with employees. The employer may be present in the workplace during inspections.

15.28.5 Information – Regulation 7

Having given reasonable notice to the employer, safety representatives are entitled to inspect and take copies of any relevant statutory documents (except any health record of an identified person).

An exempt document is one:

- ▶ which could endanger national security;
- ▶ which could cause substantial commercial injury on the employer;
- ▶ that contravenes a prohibition;
- ▶ that relates to an individual without their consent;

- ▶ which has been obtained specifically for legal proceedings.

15.28.6 Safety committees – Regulation 9

When at least two safety representatives have requested in writing that a safety committee is set up the employer has 3 months to comply. The employer must consult with the safety representatives and produce a notice stating its composition and the workplaces covered by it, in a place where it can be easily read by employees. The guidance gives details on the composition and running of safety committees.

15.28.7 Complaints – Regulation 11

If the employer fails to permit safety representatives time off or fails to pay for time off, complaints can be made to an industrial tribunal within 3 months of the incident.

15.28.8 Further information

Consulting workers on health and safety: Safety representatives and safety Committees Regulations 1977 (as amended) and Health and Safety (Consultation with Employees) Regulations 1996 (as amended). Approved Codes of Practice and guidance. L146 (Second edition), 2014, HSE Books, ISBN 978 0 7176 6461 0 <http://www.hse.gov.uk/pubns/priced/l146.pdf>

Consulting employees on health and safety. A brief guide to the law. INDG232(rev2) 2013, HSE Books, <http://www.hse.gov.uk/pubns/indg232.pdf>

15.29 Health and Safety (Safety Signs and Signals) Regulations 1996

15.29.1 Introduction

These Regulations came into force in April 1996. The results of the risk assessment made under the Management of Health and Safety at Work Regulations will have identified situations where there may be a residual risk when warnings or further information are necessary. If there is no significant risk there is no need to provide a sign.

15.29.2 Definitions – Regulation 2

"Safety sign" means a sign referring to a specific object, activity or situation and providing information or instruction about health and safety at work by means of a signboard, a safety colour, an illuminated sign, an acoustic sign, a verbal communication or a hand signal.

'Signboard' means a sign which provides information or instructions by a combination of geometric shape, colour and a symbol or pictogram and which is rendered visible by lighting of sufficient intensity.

'Hand signal' means a movement or position of the arms or hands or a combination, in coded form, for guiding persons who are carrying out manoeuvres which create a risk to the health and safety of people at work.

'Acoustic signal' means a coded sound signal which is released and transmitted by a device designed for that purpose, without the use of a human or artificial voice.

'Verbal communication' means a predetermined spoken message communicated by a human or artificial voice.



Figure 15.11

15.29.3 Provision and maintenance of safety signs – Regulation 4

The Regulations require employers to use and maintain a safety sign where there is a significant risk to health and safety that has not been avoided or controlled by other means, like engineering controls or safe systems of work, and where the use of a sign can help reduce the risk.

They apply to all workplaces and to all activities where people are employed, but exclude signs used in connection with transport or the supply and marketing of dangerous substances, products and equipment.

The Regulations require, where necessary, the use of road traffic signs in workplaces to regulate road traffic.



Figure 15.12

15.29.4 Information, instruction and training – Regulation 5

Every employer shall ensure that:

- ▶ comprehensible and relevant information on the measures to be taken in connection with safety signs is provided to each employee;
- ▶ each employee receives suitable and sufficient instruction and training in the meaning of safety signs.

15.29.5 Functions of colours, shapes and symbols in safety signs

Safety colours

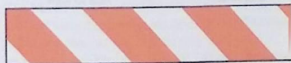
Red

Red is a safety colour and must be used for any:

- ▶ prohibition sign concerning dangerous behaviour (e.g. the safety colour on a 'No-Smoking' sign). Prohibition signs must be round, with a black pictogram on a white background with red edging and a red diagonal line (top left, bottom right). The red part must take up at least 35% of the area of the sign;
- ▶ danger alarm concerning stop, shutdown, emergency cut-out devices, evacuate (e.g. the safety colour of an emergency stop button on equipment);

- ▶ fire-fighting equipment. Rectangular or square shape with white pictogram on a red background (red part must be at least 50% of the area of the sign).

Red and white alternating stripes may be used for marking surface areas to show obstacles or dangerous locations.



Obstacles or dangerous locations

Yellow

Yellow (or amber) is a safety colour and must be used for any warning sign concerning the need to be careful, take precautions, examine or the like (e.g. the safety colour on hazard signs, such as for flammable material, electrical danger). Warning signs must be triangular, with a black pictogram on a yellow (or amber) background with black edging. The yellow (or amber) part must take up at least 50% of the area of the sign. Stripes should be of equal size and at 45 degrees.

Yellow and black alternating stripes may be used for marking surface areas to show obstacles or dangerous locations.



Obstacles or dangerous locations

Yellow may be used in continuous lines showing traffic routes.



Figure 15.13

Blue

Blue is a safety colour and must be used for any mandatory sign requiring specific behaviour or action (e.g. the safety colour on a 'Safety Helmet Must Be Worn' sign or a 'Pedestrians Must Use This Route' sign). Mandatory signs must be round, with a white pictogram on a blue background. The blue part must take up at least 50% of the area of the sign.

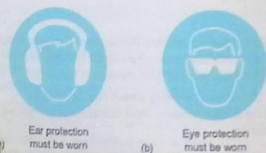


Figure 15.14

Green

Green is a safety colour and must be used for emergency escape signs (e.g. showing emergency doors, exits and routes) and first-aid signs (e.g. showing location of first-aid equipment and facilities). Escape and first-aid signs must be rectangular or square, with a white pictogram on a green background. The green part must take up at least 50% of the area of the sign. So long as the green takes up at least 50%

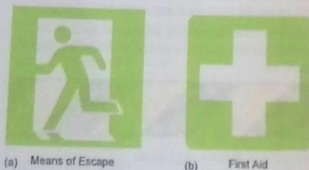


Figure 15.15

of the area, it is sometimes permitted to use a green pictogram on a white background, for example where there is a green wall and the reversal provides a more effective sign than one with a green background and white border.

Other colours

White

White is not a safety colour but is used for: pictograms or other symbols on blue and green signs; in alternating red and white stripes to show obstacles or dangerous locations; in continuous lines showing traffic routes.

Black

Black is not a safety colour but is used: for pictograms or other symbols on yellow (or amber) signs and, except for fire signs, red signs; in alternating yellow and black stripes to show obstacles or dangerous locations.

Shapes

- ▶ Round signs must be used for: any prohibition (red sign); mandatory (blue) sign.
- ▶ Triangular signs must be used for any warning (yellow or amber) sign.
- ▶ Square or rectangular signs must be used for any emergency escape sign and any first-aid sign.

Pictograms and other symbols

The meaning of a sign (other than verbal communication) must not rely on words. However, a sign may be supplemented with words to reinforce the message provided the words do not in fact distract from the message or create a danger.

A sign (other than verbal communication, acoustic signals or hand signals) should use a simple pictogram and/or other symbol (such as directional arrows, exclamation mark) to effectively communicate its message and so overcome language barriers.

Pictograms and symbols are included in the Regulations. Employee training is needed to understand the meaning of these as many are not inherently clear, some are meaningless to anyone who has not had their meaning explained and some can even be interpreted with their opposite meaning.

Pictograms and symbols included in the Regulations do not cover all situations for which graphic representation of a hazard or other detail may be needed. Any sign used for a situation not covered in the Regulations should include:

- ▶ the international symbol for general danger (exclamation mark!) if the sign is a warning sign and tests show that the sign is effective;
- ▶ in any other case a pictogram or symbol which has been tested and shown to be effective.

BS EN 7010:2012

These standards aim to bring about consistency in safety signage internationally. The date for adoption was January 2013, when it became a European Normative. Therefore, at that time, it replaced BS5499-5, the previous British Standard.

British Standards are not law. They are Codes of Practice, generally affecting only new products, as opposed to those previously produced. However, it is possible for standards to be given a type of legal status when they are referred to within legislation or government-issued guidance and Approved Codes of Practice.

The EC Directive 92/58/EEC and UK Health and Safety (Signs and Signals) Regulations 1996 now need to be updated to reflect the BS EN ISO 7010 symbols. However, there is no apparent plan to change them yet to incorporate BS EN ISO 7010.

The guidance on these regulations published in 2009 (still the most current version) stated that businesses could continue to use the BS5499-5 fire escape signage if they preferred. Luckily for many companies, BS5499-5, the old UK standard for fire escape signs, was used as the basis for BS EN ISO 7010.

The text of any words used to supplement a sign must convey the same meaning. For example, a round blue sign with a pictogram showing the white outline of a face with a solid white helmet on the head means 'Safety Helmet Must Be Worn' and so any text used must maintain the obligatory nature of the message.

15.29.6 Further information

The Health and Safety (Safety Signs and Signals) Regulations 1996, SI 1996/341. Stationary Office <http://www.legislation.gov.uk/ukxi/1996/341/contents/made>

Safety Signs and Signals Guidance on the Regulations (64 (2nd Ed), 2009, HSE Books, ISBN 978 0 7176 6359 0. <http://www.hse.gov.uk/pubns/books/164.htm>

BS EN ISO 7010: 2012, Graphical symbols. Safety colours and safety signs. Registered safety signs British Standards Institute 2011 <http://shop.bsigroup.com/en/ProductDetail/?pid=00000000030254963>

15.30 The Supply of Machinery (Safety) Regulations 2008 as amended**15.30.1 Introduction**

The Supply of Machinery (Safety) Regulations 2008 and the Supply of Machinery (Safety) (Amendment) Regulations 2011 implement Directives 2006/42/EC and 2009/127/EC on Machinery. Their scope extends to other products such as safety components, lifting tackle and partly completed machinery, but excludes such

items as domestic electrical machines and fairground equipment.

The Regulations require that all machinery:

- ▶ is designed and constructed to be safe, meeting the essential health and safety requirements listed in the Regulations (these are supported by many harmonised standards);
- ▶ is CE marked;
- ▶ is supplied with instructions in English
- ▶ has a Declaration of Conformity (or, in the case of partly completed machinery, a Declaration of Incorporation).

These Regulations apply to manufacturers or their authorised representatives. In some cases, they apply to others – such as importers of non-CE-marked equipment from outside the EU, and those who design and construct machinery for their own use. However, the Regulations do not usually apply to intermediate suppliers of CE-marked machinery, which is covered by Section 6 of the HSW Act. (The non-application of the Regulations to intermediate suppliers may change in the next few years, when the Machinery Directive is brought into line with other EU legislation.) Both the HSE and local trading standards enforce the provisions of these Regulations, depending on the field of use of the equipment (the HSE leads where machinery is for use at work).

15.30.2 Main requirements for manufacturers

The Machinery Directives, and therefore the Supply of Machinery Regulations and amendments, requires manufacturers of machinery (or their 'authorised representatives') to undertake the following activities before they can place machinery on the European market or put it into service:

- ▶ Carry out a detailed risk assessment by:
 - ▶ identifying the health and safety hazards (trapping, crushing, electrical shock, dust or fumes, noise, vibration, etc.) that are likely to be present when the machinery is used. The essential health and safety requirements listed in the Regulations should be used by manufacturers as a guide to ensure all possible hazards have been considered, and that they have identified those relevant to the machine;
 - ▶ assessing the likely level of risks involved;
- ▶ eliminate significant risks or, if that is not possible;
- ▶ provide safeguards (e.g. guarding dangerous parts of the machinery, providing noise enclosures, etc.) or, if that is not possible;
- ▶ provide information about any residual risks and place signs on the machinery to warn of risks that cannot be reduced in other ways (e.g. 'noisy machine' signs).

15

15.30.3 Suppliers requirements

If machinery is manufactured in the European Economic Area (EEA), suppliers should do all they can to ensure it is safe. If importing machinery from outside the EEA and it is CE marked with a Declaration of Conformity, suppliers will still need to follow the same checks as for machinery built inside the EEA. If it is not CE-marked with a Declaration of Conformity, suppliers will need to make sure the machinery meets the requirements of the law in full as if they were the manufacturer. This means ensuring the machinery:

- ▶ meets the essential health and safety requirements;
- ▶ has (in certain cases) undergone conformity assessment by a notified body;
- ▶ has a technical file and Declaration of Conformity; and
- ▶ is CE marked.

Suppliers who are importing partly completed machinery, should ensure it is supplied with instructions for its final incorporation with other machinery/equipment and a Declaration of Incorporation. Partly completed machinery should not be CE marked. The manufacturer of partly completed machinery should hold technical documentation in one of the European Community languages, and must be able to produce it upon request to any relevant enforcing authority.

15.30.4 Further information

Buying New Machinery – A Short Guide to the Law (INDG271(rev1), 2011, HSE Books, www.hse.gov.uk/pubns/indg271.pdf)

Supplying New Machinery Advice to Suppliers (INDG270, HSE, 2011, www.hse.gov.uk/pubns/indg270.pdf)

The Supply of Machinery (Safety) Regulations 2008, (PSI: <http://www.legislation.gov.uk/ukksi/2008/1557/contents/made>)

15.31 Control of Vibration at Work Regulations 2005

15.31.1 Introduction

These Regulations implement European Directive Vibration Directive 2002/44/EC. They came into force in July 2005 with some transitional arrangements for the exposure limits until 2010 (2014 for WBV the whole-body vibration exposure limit value for agriculture and forestry sectors).

The Regulations impose duties on employers to protect employees who may be exposed to risk from vibration at work, and other persons who may be affected by the work.

15.31.2 Interpretation – Regulation 2

'Daily exposure' means the quantity of mechanical vibration to which a worker is exposed during a working

day, normalised to an 8-hour reference period, which takes account of the magnitude and duration of the vibration.

'Hand-arm vibration' (HAV) means mechanical vibration which is transmitted into the hands and arms during a work activity.

'Whole-body vibration' (WBV) means mechanical vibration which is transmitted into the body when seated or standing through the supporting surfaces, during a work activity or as described in Regulation 5(3)(f).

15.31.3 Application – Regulation 3

For work equipment first provided to employees for use prior to 6 July 2007 and where compliance with the exposure limit values is not possible, employers had until 2010 to comply and in the case of agriculture and forestry 2014 (for WBV).

However, action must be taken to use the latest technical advances and the organisational measures in accordance with Regulation 6(2).

15.31.4 Exposure limit values and action values – Regulation 4

HAV

- (a) 8-hour daily exposure limit value is $5 \text{ m/s}^2 \text{ A(8)}$;
- (b) 8-hour daily exposure action value is $2.5 \text{ m/s}^2 \text{ A(8)}$;
- (c) daily exposure ascertained as set out in Schedule 2 Part 1.

WBV

- (a) 8-hour daily exposure limit value is $1.15 \text{ m/s}^2 \text{ A(8)}$;
- (b) 8-hour daily exposure action value is $0.5 \text{ m/s}^2 \text{ A(8)}$;
- (c) daily exposure ascertained as set out in Schedule 2 Part 1.

15.31.5 Assessment of risk to health created by vibration at the workplace – Regulation 5

A suitable and sufficient risk assessment must be made where work liable to expose employees is carried on. The risk assessment must identify the measures which need to be taken to comply with these Regulations.

Assessment of daily exposure should be by means of:

- ▶ observation of specific working practices;
- ▶ reference to relevant work equipment vibration data;
- ▶ if necessary, measurement of the magnitude of vibration to which employees are exposed;
- ▶ likelihood of exposure at or above an exposure action value or above an exposure limit value.

The risk assessment shall include consideration of:

- ▶ the magnitude, type and duration of exposure, including any exposure to intermittent vibration or repeated shocks;

- ▶ the effects of exposure to vibration on employees whose health is at particular risk from such exposure;
- ▶ any effects of vibration on the workplace and work equipment, including the proper handling of controls, the reading of indicators, the stability of structures and the security of joints;
- ▶ any information provided by the manufacturers of work equipment;
- ▶ the availability of replacement equipment designed to reduce exposure to vibration;
- ▶ any extension of exposure at the workplace to WBV beyond normal working hours, including exposure in rest facilities supervised by the employer;
- ▶ specific working conditions such as low temperatures;
- ▶ appropriate information obtained from health surveillance including, where possible, published information.

The risk assessment shall be reviewed regularly and forthwith if:

- ▶ there is reason to suspect that the risk assessment is no longer valid; or
- ▶ there has been a significant change in the work to which the assessment relates;
- ▶ and where, as a result of the review, changes to the risk assessment are required, those changes shall be made.

The employer shall record:

- ▶ the significant findings of the risk assessment as soon as is practicable after the risk assessment is made or changed;
- ▶ the measures which they have taken and which they intend to take to meet the requirements of Regulations 6 and 8.

15.31.6 Elimination or control of exposure to vibration at the workplace – Regulation 6

Following the general principles of prevention in the Management Regulations, the employer shall ensure that risk from the exposure of his or her employees to vibration is either eliminated at source or reduced as low as reasonably practicable.

Where this is not reasonably practicable and the risk assessment indicates that an exposure action value is likely to be reached or exceeded, the employer shall reduce exposure to as low as reasonably practicable by establishing and implementing a programme of organisational and technical measures which is appropriate.

Consideration must be given to:

- ▶ other working methods which eliminate or reduce exposure to vibration;
- ▶ a choice of work equipment of appropriate ergonomic design which, taking account of the work to be done, produces the least possible vibration;

- ▶ the provision of auxiliary equipment which reduces the risk of injuries caused by vibration;
- ▶ appropriate maintenance programmes for work equipment, the workplace and workplace systems;
- ▶ the design and layout of workplaces, work stations and rest facilities;
- ▶ suitable and sufficient information and training for employees, such that work equipment may be used correctly and safely, in order to minimise their exposure to vibration;
- ▶ limitation of the duration and intensity of exposure to vibration;
- ▶ appropriate work schedules with adequate rest periods;
- ▶ the provision of clothing to protect employees from cold and damp.

Subject to implementation dates, the employer shall:

- ▶ ensure that no employees are exposed to vibration above an exposure limit value, or
- ▶ ensure if an exposure limit value is exceeded, the employer shall forthwith:
 - ▷ take action to reduce exposure to vibration below the limit value;
 - ▷ identify the reason for that limit being exceeded;
 - ▷ modify the organisational and technical measures taken to prevent it being exceeded again.

This shall not apply where the exposure of an employee to vibration is usually below the exposure action value but varies markedly from time to time and may occasionally exceed the exposure limit value, provided that:

- ▶ any exposure to vibration averaged over 1 week is less than the exposure limit value;
- ▶ there is evidence to show that the risk from the actual pattern of exposure is less than the corresponding risk from constant exposure at the exposure limit value;
- ▶ risk is reduced to as low as reasonably practicable, taking into account the special circumstances;
- ▶ the employees concerned are subject to increased health surveillance, where such surveillance is appropriate.

Account must be taken of any employee whose health is likely to be particularly at risk from vibration.

15.31.7 Health surveillance – Regulation 7

If:

- ▶ the risk assessment indicates that there is a risk to the health of any employees who are, or are liable to be, exposed to vibration, or
- ▶ employees are exposed to vibration at or above an exposure action value;

then the employer shall ensure that such employees are under suitable health surveillance. Records must be kept, and employees given access to their own records

and the enforcing authorities provided with copies, as may be required. A range of specified action is required if problems are found with the health surveillance results.

15.31.8 Information, instruction and training – Regulation 8

if:

- ▶ the risk assessment indicates that there is a risk to the health of employees who are, or who are liable to be, exposed to vibration; or
- ▶ employees are exposed to vibration at or above an exposure action value;

then the employer shall provide those employees and their representatives with suitable and sufficient information, instruction and training.

The information, instruction and training provided shall include:

- ▶ the organisational and technical measures taken in order to comply with the requirements of Regulation 6;
- ▶ the exposure limit values and action values;
- ▶ the significant findings of the risk assessment, including any measurements taken;
- ▶ the why and how to detect and report signs of injury;
- ▶ entitlement to appropriate health surveillance;
- ▶ safe working practices to minimise exposure to vibration;
- ▶ the collective results of any health surveillance undertaken in accordance with Regulation 7 in a form calculated to prevent those results from being identified as relating to a particular person.

The information, instruction and training required must be adapted to take account of significant changes in the type of work carried out or methods of work used by the employer, and cover all persons who carry out work in connection with the employer's duties under these Regulations.

15.31.9 Further information

Control Back-Pain Risks from Whole-Body Vibration Advice for Employers on the Control of Vibration at Work Regulations 2005 INDG242 (rev 1), HSE Books, 2005, ISBN 978 0 7176 6119 0. <http://www.hse.gov.uk/pubns/indg242.pdf>

Control of Vibration at Work Regulations 2005 SI No 1093. <http://www.legislation.gov.uk/ukSI/2005/1093/contents/made>

Drive Away Bad Backs Advice for Mobile Machine Operators and Drivers INDG404, 2005, HSE Books, ISBN 9780 7176 6120 6. <http://www.hse.gov.uk/pubns/indg404.pdf>

Hand-Arm Vibration Advice for Employees Pocket Card INDG296 (rev 2), 2014, HSE Books, <http://www.hse.gov.uk/pubns/indg296.pdf>

Hand-arm vibration at work: A brief guide, INDG175(rev3), HSE Books, 2012, ISBN 978 07176 6488 7. <http://www.hse.gov.uk/pubns/indg175.htm>

Hand-Arm Vibration: Control of Vibration at Work Regulations L140, HSE Books, 2005, ISBN 978 0 7176 6125. 1 <http://www.hse.gov.uk/pubns/books/l140.htm>

Vibration Solutions Practical Way to Reduce the Risk of Hand-Arm Vibration HSG170, HSE Books, 1997, ISBN 978 0 7176 0954 3. <http://www.hse.gov.uk/pubns/books/hsg170.htm>

Whole Body Vibration: The Control of Vibration at Work Regulations Guidance on Regulations L141, HSE Books, 2005, ISBN 987 0 7176 6126 8. <http://www.hse.gov.uk/pubns/priced/l141.pdf>

15.32 Workplace (Health, Safety and Welfare) Regulations 1992 as amended in 2002 and 2013

15.32.1 General

These Regulations were made to implement the European Directive on the minimum safety and health requirements for the workplace. A workplace for these purposes is defined very widely, to include any part of non-domestic premises to which people have access while at work, and any room, lobby, corridor, staircase or other means of access to or exit from them. The main exceptions to these rules are construction sites, means of transport, mines and quarries and other mineral extraction sites. The stability and solidity of workplaces in a building were added in 2002. Ships in a British port not under the control of a master are now covered by the 2013 amendment to these Regulations.

Employers have a duty to ensure that workplaces under their control comply with the requirements of these Regulations. Any workplace and relevant equipment, devices and systems must be properly maintained. A maintenance system must be set up where appropriate, that is where a fault could result in a failure to comply and/or mechanical ventilation systems provided under Regulation 6.

The main requirements are summarised below. They are expressed in very general terms, and in each case it will be necessary to turn to the Approved Code of Practice associated with these Regulations for clarification of what is necessary to meet the objectives set.

15.32.2 Health: The Working Environment – Regulations 6–10

Ventilation

Ventilation must be effective in enclosed areas, and any plant used for this purpose must incorporate warning devices to signal breakdowns which might endanger health or safety.

Reasonable temperature

Reasonable temperature must be maintained during working hours and sufficient thermometers must be provided to enable people at work to determine temperature in any workroom. The temperature should be comfortable without the need for special clothing. Special guidance is available for areas like food processing where it could be very hot or very cold. Temperature should be at least 16°C, or where strenuous effort is involved, 13°C.

Lighting

Lighting must be suitable and sufficient. This should be particularly important for lighting staircases.

Emergency lighting

Emergency lighting shall be provided where persons are especially exposed to danger if artificial light fails. Lights should avoid glare and dazzle and should not themselves cause a hazard. They should not be obscured, and be properly maintained.

Workplaces, furniture and fittings

Workplaces furniture and fittings should be kept sufficiently clean. Surfaces inside buildings shall be kept clean and be properly maintained.

Floors

Floors should not be slippery and wall surfaces should not increase fire risks.

Waste materials

Wastes should not be allowed to accumulate, except in suitable receptacles and should be kept free from offensive waste products and discharges.

Room dimensions

Room dimensions have to allow adequate unoccupied space to work in and to move freely; 11 m³ minimum per person is required, excluding anything over 3 m high and furniture, etc.

Workstations

Workstations shall be suitable for any person in the workplace who is likely to work at that workstation and for any work that is likely to be done there.

Outside workstations

Outside workstations shall provide, if appropriate, protection from adverse weather; provide adequate means of escape in emergencies; and ensure that no person is likely to slip or fall.

Seating

Seating shall be provided where work can or must be done sitting and shall be suitable for the person as well as the work. A footrest shall be provided where necessary.

15.32.3 Safety: Accident Prevention – Regulations 5, 12–19

Maintenance

The workplace and equipment, devices and systems shall be maintained (including cleaned as appropriate) in an efficient state, efficient working order and in good repair, and where appropriate subject to a system of maintenance. This generally means planned rather than breakdown maintenance. Systems include ventilation, emergency lighting, safety fences, window cleaning devices, and moving walkways.

Floors and traffic routes

Floors and the surface of traffic routes shall be suitably constructed for their intended purpose and free of slope and holes (unless fenced). They should not be uneven or slippery. The traffic routes should be of adequate width and height to allow people and vehicles to circulate safely with ease and they should be kept free of obstructions.

Additional precautions are necessary where pedestrians have to cross or share vehicle routes. Open sides of staircases should be fenced with an upper rail 900 mm or higher and a lower rail. Loading bays should have exits or refuges to avoid people getting crushed by vehicles.

Falls and falling objects

Now covered by Work at Height Regulations 2005 (see Section 15.33).

Tanks and pits

Where there is a risk of falling into a tank, pit or structure containing a dangerous substance that is likely to:

- ▶ scald or burn;
- ▶ be poisonous or corrosive;
- ▶ have an asphyxiating gas, fume or vapour;
- ▶ have any granular or free-flowing substance likely to cause harm;

adequate measures must be taken to securely fence or cover the tank, pit or structure.

Ladders and roofs

Now covered by Work at Height Regulations 2005 (see Section 15.33).

Glazing

Windows and transparent doors and partitions must be appropriately marked and protected against breakage.

Windows

Windows and skylights must open and close safely, and be arranged so that people may not fall out of them. They must be capable of being cleaned safely.

Traffic routes

Pedestrians and vehicles must be able to circulate safely. Separation should be provided between vehicles and people at doors, gateways and common routes. Workplaces should have protection from vehicles.

Doors and gates

Doors, gates and moving walkways have to be of sound construction and fitted with appropriate safety devices.

15.32.4 Welfare: provision of facilities – Regulations 20–25

Sanitary conveniences and washing facilities

Suitable and sufficient sanitary conveniences and washing facilities should be provided at readily accessible places. The facilities must be kept clean, adequately ventilated and lit. Washing facilities should have running hot and cold or warm water, soap and clean towels or other method of cleaning or drying. If necessary, showers should be provided. Men and women should have separate facilities unless each facility is in a separate room with a lockable door and is for use by only one person at a time.

Drinking water

An adequate supply of wholesome drinking water, with an upward drinking jet or suitable cups, should be provided. Water should only be supplied in refillable enclosed containers where it cannot be obtained directly from a mains supply.

Accommodation for clothing and facilities for changing

Adequate, suitable and secure space should be provided to store workers' own clothing and special clothing. The facilities should allow for drying clothing. Changing facilities should also be provided for workers who change into special work clothing.

Facilities to rest and to eat meals

Suitable and sufficient, readily accessible, rest facilities should be provided. Arrangements should include suitable facilities to eat meals; adequate seats with

backrests and tables; and means of heating food (unless hot food is available nearby) and making hot drinks.

Canteens or restaurants

Canteens and restaurants may be used as rest facilities, provided there is no obligation to purchase food.

Suitable rest facilities

Suitable rest facilities should be provided for pregnant women and nursing mothers. They should be near sanitary facilities and, where necessary, include the facility to lie down.

Non-smokers

This is now covered by the smoke-free legislation which bans smoking in largely enclosed or enclosed work or public places. See Section 15.35.17.

15.32.5 Further information

How to Deal with Sick Building Syndrome: Guidance for Employers, Building Owners and Building Managers HSG132, HSE Books, 1995, ISBN 978 0 7176 0661 4, <http://www.hse.gov.uk/pubns/books/hsg132.htm>

Lighting at Work HSG38, HSE Books, 1997, ISBN 978 0 7176 1232 1, <http://www.hse.gov.uk/pubns/books/hsg38.htm>

Seating at Work HSG57, HSE Books, 1997, ISBN 978 0 7176 1231 4, <http://www.hse.gov.uk/pubns/books/hsg57.htm>

The Workplace (Health, Safety and Welfare) Regulations 1992, <http://www.legislation.gov.uk/ukSI/1992/3004/made/data.pdf>

Workplace Health, Safety and Welfare. Workplace (Health, Safety and Welfare) Regulations 1992 Approved Code of Practice and Guidance L24 (second edition), 2013, HSE Books, ISBN 978 0 7176 65839, <http://www.hse.gov.uk/pubns/priced/l24.pdf>

Workplace Health, Safety and Welfare A Short Guide, INDG244 (rev 2), 2011, HSE Books, ISBN 978 0 7176 6277 7, <http://www.hse.gov.uk/pubns/indg244.pdf>

15.33 Work at Height Regulations 2005 as amended in 2007

15.33.1 Introduction

These Regulations bring together all current requirements on work at height into one goal-based set of Regulations. They implement the requirements of the 2nd Amending Directive (2001/45/EC) to the Use of Work Equipment Directive (89/655/EEC) which sets out requirements for work at height. The 2nd Amending Directive has become known as the Temporary Work at Height Directive.

The Work at Height (Amendment) Regulations 2007, which came into force on 6 April 2007, apply to those who work at height providing instruction or leadership to one or more people engaged in caving or climbing by way of sport, recreation, team building or similar activities in Great Britain.

The Regulations require a risk assessment for all work conducted at height and arrangements to be put in place for:

- ▶ eliminating or minimising risks from working at height;
- ▶ safe systems of work for organising and performing work at height;
- ▶ safe systems for selecting suitable work equipment to perform work at height;
- ▶ safe systems for protecting people from the consequences of work at height.

15.33.2 Definitions – Regulation 2

'Work at height' means:

- (a) work in any place, including a place at or below ground level;
- (b) obtaining access to or egress from such place while at work except by a staircase in a permanent workplace where, if measures required by these Regulations were not taken, a person could fall a distance liable to cause personal injury.

'Working platform':

- (a) means any platform used as a place of work or as a means of access to or egress from a place of work;
- (b) includes any scaffold, suspended scaffold, cradle, mobile platform, trestle, gangway, gantry and stairway which is so used.

15.33.3 Organisation, planning and competence – Regulations 4 and 5

Work at height must be properly planned, appropriately supervised and carried out in a manner which is, safe, fair, safe. The selection of appropriate work equipment is included in the planning. Work must not be carried out if the weather conditions would jeopardise safety or health (this does not apply where members of the police, fire, ambulance or other emergency services are acting in an emergency).

All people involved in work at height activity including planning, organising and supervising must be competent for such work, or if being trained, under competent supervision.

15.33.4 Avoidance of Risk – Regulation 6

A risk assessment carried out under the Management Regulations must be taken into account when identifying the measures required by these Regulations.

Work at height should be avoided if there are reasonably practicable alternatives.

Where work at height is carried out employers must take suitable and sufficient measures to prevent persons falling a distance liable to cause personal injury. The measures include:

- (a) ensuring work is carried out:
 - (i) from an existing workplace;
 - (ii) using existing means of access and egress that comply with Schedule 1 of the Regulations (assuming it is safe and ergonomic to do so).
- (b) where this is not reasonably practicable, providing work equipment (sfairp) for preventing a fall occurring.

Employers must take steps to minimise the distance and the consequences of a fall, if it is not prevented. Where the distance cannot be minimised (sfairp) the consequence of a fall must be minimised and additional training, instruction and other additional suitable and sufficient measures must be adopted to prevent a person falling a distance liable to cause personal injury.

See Figure 15.16, which shows a flow chart for the work at height risk assessment.

15.33.5 General principles for selection of work equipment – Regulation 7

Collective protection measures must have priority over personal protection measures.

Employers must take account of:

- ▶ working conditions and the risks to the safety of persons at the place where the work equipment is to be used;
- ▶ the distance to be negotiated for access and egress;
- ▶ distance and consequences of a potential fall;
- ▶ duration and frequency of use;
- ▶ need for evacuation and rescue in an emergency;
- ▶ additional risks of using, installing and removing the work equipment used or evacuation and rescue from other provisions of the Regulations.

Work equipment must:

- ▶ be appropriate for the nature of the work and the foreseeable loadings;
- ▶ allow passage without risk;
- ▶ be the most suitable work equipment having regard in particular to Regulation 6.

15.33.6 Requirements for particular work equipment – Regulation 8

Regulation 8 requires that various pieces of work equipment comply with the schedules to the Regulations as follows:

- (a) A guard-rail, toe-board, barrier or similar means of protection comply with Schedule 2.

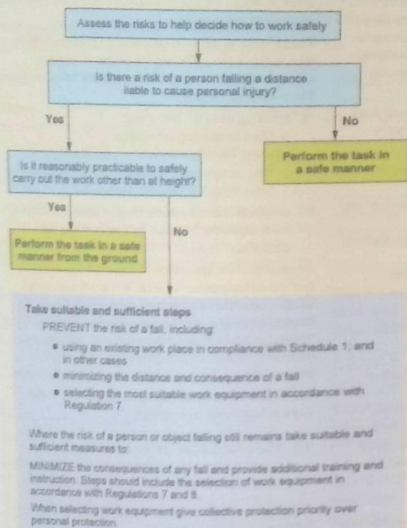


Figure 15.16 Work at Height – Flowchart

Schedule 2 in summary:

- ▶ they must be suitable, of sufficient dimensions, of sufficient strength and rigidity;
- ▶ be so placed, secured and used to prevent accidental displacement;
- ▶ prevent fall of persons and materials;
- ▶ supporting structure to be of sufficient strength and suitable for the purpose;
- ▶ no lateral opening save at point of access to a ladder or stairway where an opening is necessary and:
 - ▶ must be in place except for a time to gain access perform a particular task and then replaced;
 - ▶ compensatory safety measures must be provided if protection removed temporarily.

(b) A working platform, comply with Schedule 3 Part 1 and, in addition, where scaffolding is provided, Schedule 3 Part 2.

Schedule 3 Part 1 in summary

Supporting structure must:

- ▶ be suitable, of sufficient strength and rigidity;
- ▶ if wheeled, be prevented, by appropriate device, from moving during work;

- ▶ not slip and have secure attachment;
- ▶ be stable while being erected, used, modified or dismantled.

Working platform to:

- ▶ be suitable and strong enough;
- ▶ have no accidental displacement of components;
- ▶ remain stable during dismantling;
- ▶ be dismantled so as to prevent accidental displacement;
- ▶ be of sufficient dimensions for safe passage and use;
- ▶ have a suitable surface and be constructed to prevent people falling through;
- ▶ have a suitable surface and be constructed to prevent material or objects falling through unless measures have been taken to protect other persons from falling objects;
- ▶ be erected, used and maintained so that risk of slipping and tripping is prevented and no person can be caught between working platform and adjacent structure;
- ▶ be not loaded so as to give risk of collapse or deformation.

Schedule 3 Part 2 additional for scaffolds:

- length and stability calculations required unless they are available already or scaffold is assembled in conformity with a generally recognised standard configuration;
- an assembly, use and dismantling plan must be drawn up. Could be standard plan with supplements; copy of the plan and instructions to be available for persons doing the work;
- dimensions, form and layout to be suitable;
- when not available for use to be marked with warning signs and physical barrier preventing access;
- must be assembled, dismantled or significantly altered under supervision of competent person.
- A net, airbag or other collective safeguard for arresting falls which is not part of a personal fall protection system, comply with Schedule 4.
- any personal fall protection system to comply with Part 1 of Schedule 5.
- in the case of a work positioning system, comply with Part 2 of Schedule 5;
- in the case of rope access and positioning techniques, comply with Part 3 of Schedule 5;
- in the case of a fall arrest system, comply with Part 4 of Schedule 5;
- in the case of a work restraint system, comply with Part 5 of Schedule 5.
- use a ladder to comply with Schedule 6.

Schedule 6 in summary:

- only to be used for work at height if the risk assessment demonstrates that the use of more suitable equipment is not justified because of the low risk and the short duration of use or existing features on site that cannot be altered;
- surface on which ladder rests must be stable, firm, of sufficient strength and suitable composition so its rungs remain horizontal;
- must be positioned to ensure stability;
- suspended ladder attached firmly without swing (except flexible ladder);
- portable ladder to be prevented from slipping by securing the stiles near their upper and lower ends and using an anti-slip device or by any other equivalent measures;
- when used for access must protrude above place of landing unless other firm handholds provided;
- interlocking or extension pieces must not move, relative to each other, during use;
- mobile ladder to be prevented from moving before being stepped on;
- where a ladder or run of ladders rises a vertical distance of 9 metres or more above its base, there shall, where reasonably practicable, be provided at suitable intervals sufficient safe landing areas or rest platforms;
- must be used so that a secure foothold and handhold are always available;

- must be used so that user can maintain a secure handhold while carrying a load (exceptions for using stepladders for low-risk, short-duration work).

15.33.7 Fragile surfaces – Regulation 9

Employers must take steps to prevent people falling through any fragile surface. Steps to be taken include:

- avoid, if possible, passing across or near, or working on or near, a fragile surface;
- where this is not reasonably practicable:
 - provide suitable and sufficient platforms, covering, guard-rails or other similar means of support or protection and use them;
 - provide suitable and sufficient guard-rails to prevent persons falling through fragile surfaces;
 - where a risk of falling remains, take suitable and sufficient measures to minimise the distances and consequences of a fall;
- provide prominent warning signs at approach to the fragile surface, or make people aware of the fragile surface if not reasonably practicable;
- where the risk of falling remains despite the precautions a suitable and sufficient fall arrest system must be provided.

15.33.8 Falling objects and danger areas – Regulations 10 and 11

Suitable and sufficient steps must be taken:

- to prevent the fall of any material or object from a height;
- if reasonably practicable, to prevent the fall of any material or object, then prevent persons being struck by falling objects or material (if liable to cause personal injury) by, for example, providing covered walkways or fan scaffolds;
- to prevent material or objects being thrown or tipped from height where it is likely to cause injury;
- to store materials and objects in such a way as to prevent risk to any person arising from collapse, overturning or unintended movement;
- where danger of being struck exists, unauthorised persons must be kept out of the area by suitable devices and the area clearly indicated;
- to store materials and objects so as to prevent collapse, overturning or moving in a way that could be a risk to people.

15.33.9 Inspection of work equipment – Regulation 12

This Regulation applies only to work equipment to which Regulation 8 and Schedules 2-6 apply. The requirements include the following:

- where work equipment used for work at height depends for safety on how it is installed or assembled, the employer must ensure that it is not used after installation or assembly in any position unless it has been inspected in that place;

- ▶ where work equipment is exposed to conditions causing deterioration which is liable to result in dangerous situations, it must also be inspected at suitable intervals and each time that exceptional circumstances which are liable to jeopardise the safety of the work equipment have occurred, for example a severe storm;
- ▶ in addition, a working platform used for construction and from which a person could fall more than 2 m has to be inspected in that position (mobile equipment on the site) before use and within the last 7 days. The particulars for this inspection are set out in Schedule 7;
- ▶ no work equipment (lifting equipment is covered under LOLER) may either leave the undertaking or be obtained from another undertaking without evidence of in-date inspection;
- ▶ results of inspections must be recorded and retained until the next due inspection is recorded. Reports must be provided within 24 hours and kept at the site until construction work is complete and thereafter at the office for 3 months.

15.33.10 Inspection of places of work at height – Regulation 13

The surface and every parapet, permanent rail or other such fall protection measure of every place of work at height must be checked on each occasion before the place is used.

15.33.11 Duties of persons at work – Regulation 12

Every person must, where working under the control of another person, report to that person any activity or defect relating to work at height which they know is likely to endanger themselves or others.

Work equipment must be used in accordance with training and instructions.

15.33.12 Further information

Tool Box Talk on Lining Ladders and Stepladders ifety INDG403, HSE Books, 2011, ISBN 978 0 7176 106 0. <http://www.hse.gov.uk/pubns/indg403.pdf>

Health and Safety in Roof Work HSG 33, 2012, HSE Books, ISBN 978 0 7176 6627 3. <http://www.hse.gov.uk/pubns/priced/hsg33.pdf>

Height Safe Essential Health and Safety Information for People who Work at Height. HSE website: <http://www.hse.gov.uk/pubns/heightsafeleaflet.pdf>

Safe Use of Ladders and Stepladders: An Employers' Guide INDG455, HSE 2014, <http://www.hse.gov.uk/pubns/indg455.pdf>

The Work at Height (Amendment) Regulations 2007, SI 2007 No. 114, <http://www.legislation.gov.uk/uksi/2007/114/contents/made>

The Work at Height Regulations 2005, SI 2005/735, OPSI, <http://www.legislation.gov.uk/uksi/2005/735/contents/made>

The Work at Height Regulations 2005 (as amended). A Brief Guide INDG401 (rev 2), 2014, <http://www.hse.gov.uk/pubns/indg401.pdf>

Tower Scaffolds CIS10, HSE Books, 2005. <http://www.hse.gov.uk/pubns/cis10.pdf>

The Selection and Management of Mobile Elevating Work Platforms CIS 58, HSE 2008, Web only. <http://www.hse.gov.uk/pubns/cis58.pdf>

Useful website – HSE's Work at Height: <http://www.hse.gov.uk/work-at-height/index.htm>

15.34 The Waste (England and Wales) Regulations 2011

15.34.1 Introduction

These regulations implement the revised EU Waste Framework Directive 2008/98 which sets requirements for the collection, transport, recovery and disposal of waste.

In summary the Waste (England and Wales) Regulations 2011 require businesses to confirm that they have applied the waste management hierarchy when transferring waste and include a declaration to this effect on their waste transfer note or consignment note.

They introduce a two-tier system for waste carrier and broker registration, including the new concept of waste dealer.

They make amendments to hazardous waste controls. They exclude some categories of waste from waste controls.

15.34.2 Who do the Waste (England and Wales) Regulations 2011 affect?

The regulations apply to businesses that:

- ▶ produce waste;
- ▶ import or export waste;
- ▶ carry or transport waste;
- ▶ keep or store waste;
- ▶ treat waste;
- ▶ dispose of waste;
- ▶ operate as waste brokers or dealers;

15.34.3 Waste management hierarchy

The hierarchy sets out, in order of priority, the waste management options that should be considered:

- ▶ prevention;
- ▶ preparing for reuse;
- ▶ recycling;

- recovery, e.g. energy recovery;
- disposal.

Since 28 September 2011, whenever waste is passed on to someone else, a declaration has to be made on the waste transfer note, or consignment note for hazardous waste, that the waste hierarchy has been considered.

The waste transfer note must also now include the 2007 Standard Industrial Classification (SIC) code of the person transferring the waste. The 2003 SIC codes should continue to be used on hazardous waste consignment notes.

15.34.4 Hazardous waste controls

Carriers of hazardous waste that operate a multiple collection round will need to include a round number and the number of collection sites on the consignment note.

15.34.5 The Waste (England and Wales) (Amendment) Regulations 2012

These Regulations were laid before Parliament and the Welsh Assembly on 19 July 2012 and came into force on 1 October 2012. The amended regulations relate to the separate collection of waste. They amend the Waste (England and Wales) Regulations 2011 by replacing regulation 13. Since 1 January 2015, waste collection authorities must collect waste paper, metal, plastic and glass separately. It also imposes a duty on waste collection authorities, from that date, when making arrangements for the collection of such waste, to ensure that those arrangements are by way of separate collection.

These duties apply where separate collection is necessary to ensure that waste undergoes recovery operations in accordance with the directive and to facilitate or improve recovery; and where it is technically, environmentally and economically practicable. The duties apply to waste classified as waste from households and waste that is classified as commercial or industrial waste. The amended regulations also replaced Regulation 14(2) to reflect the changes to Regulation 13 to ensure a consistent approach. Consequential changes are also made to reflect changes in paragraph numbering in the new Regulation 13.

Environmental permitting for waste

The recovery and disposal of waste requires a permit under EU legislation with the principal objective of preventing harm to human health and the environment. This legislation also allows member states to provide for exemptions from the need for a permit, providing general rules are laid down for each type of exempt activity, and the operation is registered with the relevant registration authority. The EU requirements have been

effected through the Environmental Permitting (England and Wales) Regulations 2010 (the 2010 Regulations). More information is available on the National Archive and on the Environment Agency website.

15.35 Other relevant legislation in brief

The following Regulations are included with brief summaries.

15.35.1 Building Regulations 2010 Approved Documents B and M

These Regulations are not in the National General Certificate but are included in the National Fire Certificate and could be useful reference for Safety Practitioners.

The Building Regulations 2010 Fire Safety – Approved Document B Volumes 1 and 2

General introduction: Fire safety

Scope:

1. Approved Document B (Fire safety) has been published in two volumes. Volume 1 deals solely with dwelling houses (see Appendix E and Building Regulation 2(1)), while Volume 2 deals with all other types of building covered by the Building Regulations.

Where very large (over 18 m in height) or unusual dwelling houses are proposed some of the guidance in Volume 2 may be needed to supplement that given by Volume 1.

Arrangement of sections

2. The functional requirements B1 to B5 of Schedule 1 of the Building Regulations are dealt with separately in one or more Sections. The requirement is reproduced at the start of the relevant Sections, followed by an introduction to the subject.
3. The provisions set out in this document deal with different aspects of fire safety, with the following aims:

B1: To ensure satisfactory provision of means of giving an alarm of fire and a satisfactory standard of means of escape for persons in the event of fire in a building.

B2: To ensure fire spread over the internal linings of buildings is inhibited.

B3: To ensure the stability of buildings in the event of fire; to ensure that there is a sufficient degree of fire separation within buildings and between adjoining buildings; to provide automatic fire suppression where necessary; and to inhibit the unseen spread of fire and smoke in concealed spaces in buildings.

- B4: To ensure external walls and roofs have adequate resistance to the spread of fire over the external envelope, and that spread of fire from one building to another is restricted.
- B5: To ensure satisfactory access for fire appliances to buildings and the provision of facilities in buildings to assist fire-fighters in the saving of life of people in and around buildings.

4. Whilst guidance appropriate to each of these aspects is set out separately in this document, many of the provisions are closely interlinked. For example, there is a close link between the provisions for means of escape (B1) and those for the control of fire growth (B2), fire containment and/or suppression (B3) and facilities for the fire and rescue service (B5). Similarly there are links between B3 and the provisions for controlling external fire spread (B4), and between B3 and B5. Interaction between these different requirements should be recognised where variations in the standard of provision are being considered. A higher standard under one of the requirements may be of benefit in respect of one or more of the other requirements. The guidance in the document as a whole should be considered as a package aimed at achieving an acceptable standard of fire safety.

Appendices: provisions common to more than one of Part B's requirements

5. Guidance on matters that refer to more than one of the Sections is in a series of Appendices, covering the following subjects:
- Appendix A – fire performance of materials, products and structures
 - Appendix B – provisions regarding fire doors
 - Appendix C – methods of measurement
 - Appendix D – a classification of purpose groups
 - Appendix E – definitions
 - Appendix F – Standards and other publications referred to.

Fire performance of materials, products and structures

6. Much of the guidance throughout this document is given in terms of performance in relation to standard fire test methods. Details are drawn together in Appendix A to which reference is made where appropriate. In the case of fire protection systems, reference is made to standards for system design and installation. Standards referred to are listed in Appendix F.

Fire doors

7. Guidance in respect of fire doors is set out in Appendix B.

Methods of measurement

8. Some form of measurement is an integral part of much of the guidance in this document and methods are set out in Appendix C.

Purpose groups

9. Much of the guidance in this document is related to the use of the building. The use classifications are termed purpose groups, and they are described in Appendix D. This document deals only with buildings in Purpose Groups 1b and 1c.

Definitions

10. The definitions are given in Appendix E.

The Building Regulations 2010 Access to and use of buildings – Approved Document M

The requirements of Part M will be met by making reasonable provision to ensure that buildings are accessible and usable. People, regardless of disability, age or gender, should be able to:

- a. gain access to buildings and to gain access within buildings and use their facilities, both as visitors and as people who live or work in them;
- b. use sanitary conveniences in the principal storey of a new dwelling.

The provisions are expected to enable occupants with disabilities to cope better with reducing mobility and to 'stay put' longer in their own homes. The provisions are not necessarily expected to facilitate fully independent living for all people with disabilities.

Where the requirements apply Application of Part M

1. The requirements apply if:

- (a) a non-domestic building or a dwelling is newly erected;
- (b) an existing non-domestic building is extended, or undergoes a material alteration; or
- (c) an existing building or part of an existing building undergoes a material change of use to a hotel or boarding house, institution, public building or shop.

The terms 'institution', 'public building' and 'shop' are explained in Regulation 2.

It should be noted that, regardless of compliance with Building Regulations, there will be obligations under the Equality Act 2010 for service providers and employers to consider barriers created by physical features in buildings.

Extensions and material alterations: dwellings

2. Under Regulation 4(3), where any building is extended, or undergoes a material alteration, the building work must be carried out so that after it has been completed the building complies with the applicable requirements of Schedule 1, or, where it did not fully comply with any applicable requirement, it is no more unsatisfactory than before.
3. This rule applies to domestic as well as to non-domestic buildings. Under the Limits on Application in Part M, Part M does not apply to an

extension of, or a material alteration of, a dwelling. However, an extension of a dwelling, or a material alteration of a dwelling, must not make the building less satisfactory in relation to Part M than it was before.

Under Regulation 3, the expression 'material alteration' is defined by reference to a list of 'relevant requirements' in Schedule 1. That list includes Part M. This means that an alteration of a dwelling is a material alteration if the work would result in the dwelling not complying with Part M where previously it did. Alternatively, if the dwelling did not previously comply with Part M, the dwelling should not be more unsatisfactory in relation to Part M after the material alteration.

It is irrelevant whether or not the dwelling was subject to Part M at the time of its construction. Under the general Limits on Application of Part M, the requirements of that Part do not apply to an extension of or a material alteration of a dwelling. This means that the extension or alteration work itself need not comply with Part M. However, a planned alteration to a dwelling that has the potential to reduce the compliance of the dwelling as a whole with Part M must be carried out in such a way that there is no reduction in the extent of Part M compliance. Similarly, an extension of a dwelling need not itself comply with Part M, but it must not result in the dwelling being less compliant with Part M.

Further information

Access to and use of Buildings Approved Document.
<http://www.planningportal.gov.uk/buildingregulations/approveddocuments/partm/approved>

Building regulations 2010 SI 2214. http://www.legislation.gov.uk/ukSI/2010/2214/pdfs/ukSI_20102214_en.pdf

Free Safety Approved Document B Volume 1 – Dwelling Houses 2006 version with 2010 and 2013 amendments. http://www.planningportal.gov.uk/uploads/br/BR_PDF_AD_B1_2013.pdf

Free Safety Approved Document B Volume 2 Buildings other than dwellings. http://www.planningportal.gov.uk/uploads/br/BR_PDF_AD_B2_2013.pdf

15.39.2 Compensation Act 2006

The Compensation Act 2006 (c.29), was introduced in response to concerns about a growing compensation culture but conversely to ensure that the public received dependable service from claims management companies.

The Compensation Act contains provisions relating to the law of negligence and breach of statutory duty; damages for mesothelioma; and the regulation of claims management services.

Section 1 of the Act makes statutory provision that, in determining whether the omission of certain steps amounts to a breach of duty, the court MAY consider whether such steps, had they been performed, would prevent some desirable activity. For example, the court must consider whether precautionary and defensive measures might prevent something socially useful. Though this principle had often been observed by the common law (see *Miller v. Jackson* 1977, Denning's judgement), the Act places it on a statutory footing.

Section 2 stipulates that, in the event of an accident, an apology or offer of redress, such as paying for medical treatment, is not, of itself an admission of liability.

Sections 1 and 2 came into force on royal assent on 26 July 2006.

Section 3 reverses the common law on allocation of damages in mesothelioma claims arising from unlawful exposure to asbestos. In 2002, the House of Lords had controversially ruled that, where several parties had unlawfully exposed the claimant to asbestos and risk of mesothelioma, all were liable for his injury, even though the claimant could not prove which individual party had provided the critical single fibre believed to cause the disease. However, in *Barker v. Corus UK Ltd* the House of Lords held that the parties who contributed to the risk were severally but not jointly liable. This meant that a single defendant could only be held liable for a fraction of any damages proportional to the exposure for which they were responsible and that a claimant could only recover all their damages if they succeeded in actions against all such contributors. Section 3 reverses the House of Lords decision by making all such parties jointly and severally liable for the damage so that a claimant could recover the total of their damages, even from a subgroup of potential defendants.

Section 3 is 'treated as having always had effect' (s.16(3)) (but does not apply to claims settled before 3 May 2006) and also extends to Scotland and Northern Ireland (s.17).

Part 2 of the Act seeks to regulate the provision of claims management services. As of 23 April 2007, an individual or a corporation may not provide claims management services by way of business unless authorised, exempt or otherwise in receipt of a waiver (s.4(1)). The Act creates a Claims Management Services Regulator to authorise and regulate claims management companies and to (s.5):

- ▶ Set and monitor standards of competence and professional conduct;
- ▶ Promote good practice, in particular as to the provision of information about charges and other matters to users;
- ▶ Promote practices likely to facilitate competition;
- ▶ Ensure that arrangements are made for the protection of users, including complaints handling.

It is a crime for an unauthorised person to provide or offer claims management services, or to pretend to be authorised. Offenders are punishable, on summary conviction, by a fine of up to level 5 on the standard scale or 51 weeks' imprisonment. If convicted on indictment in the Crown Court, offenders can be sentenced to an unlimited fine or two years' imprisonment (ss.7 and 11). Where a corporate crime is committed, the offender can only be fined and not imprisoned. The Regulator may investigate unauthorised trading and seek an injunction to prevent it or bring a criminal prosecution (s.8). It is a crime to obstruct the Regulator, punishable on summary conviction by a fine of up to level 5 on the standard scale (s.10).

Section 12 creates a Claims Management Services Tribunal to which a person may appeal a decision of the Regulator about authorisation (s.13(1)). There is a further route of appeal to the Court of Appeal (s.13(4)).

Part 2 came progressively into force from 1 December 2006.

15.35.3 Control of Asbestos Regulations 2012

The Control of Asbestos Regulations 2012 came into force on 6 April 2012 (Asbestos Regulations – SI 2012/632).

In practice the changes are fairly limited. They mean that some types of non-licensed work with asbestos now have additional requirements, i.e. notification of work, medical surveillance and record keeping. **All other requirements remain unchanged.**

Most work with asbestos needs to be carried out by a **licensed contractor**. This includes work on asbestos coating and asbestos lagging; and work on asbestos insulation or asbestos insulating board (AIB) where the risk assessment demonstrates that the fibre release will be high, e.g. the material is badly damaged, or the work is not short duration work.

'Short duration' means any one person doing this type of work for less than one hour, or more people doing this work for a total of less than two hours, in any seven consecutive days. The total time spent by all workers must not exceed two hours. This includes time spent setting up, cleaning and clearing up. Non-licensed work includes work on asbestos-containing textured coatings and asbestos cement.

From 6 April 2012, some non-licensed work needs to be **notified** to the relevant enforcing authority. Brief written records should be kept of non-licensed work, which has to be notified, e.g. a copy of the notification with a list of workers on the job, plus the level of likely exposure of those workers to asbestos. This does not require air monitoring on every job, if an estimate of degree of exposure can be made based on experience of similar past tasks or published guidance.

By April 2015, all workers/self-employed doing **notifiable** non-licensed work with asbestos must be under health surveillance by a Doctor. Workers who are already under health surveillance for licensed work need not have another medical examination for non-licensed work. BUT medicals for notifiable non-licensed work are not acceptable for those doing licensed work.

Some modernisation of language and changes to reflect other legislation, e.g. the prohibition section has been removed, as the prohibition of supply and use of asbestos is now covered by REACH.

The Asbestos Regulations also include the 'duty to manage asbestos' in non-domestic premises.

The duty to manage asbestos is contained in Regulation 4. It requires the person who has the duty (i.e. the 'duty-holder') to:

- ▶ take reasonable steps to find out if there are materials containing asbestos in non-domestic premises, and if so, its amount, where it is and what condition it is in;
- ▶ presume materials contain asbestos unless there is strong evidence that they do not;
- ▶ make, and keep up to date, a record of the location and condition of the asbestos-containing materials – or materials which are presumed to contain asbestos;
- ▶ assess the risk of anyone being exposed to fibres from the materials identified;
- ▶ prepare a plan that sets out in detail how the risks from these materials will be managed;
- ▶ take the necessary steps to put the plan into action;
- ▶ periodically review and monitor the plan and the arrangements to act on it so that the plan remains relevant and up to date; and
- ▶ provide information on the location and condition of the materials to anyone who is liable to work on or disturb them.

The Regulations require mandatory training for anyone liable to be exposed to asbestos fibres at work (see Regulation 10). This includes maintenance workers and others who may come into contact with or who may disturb asbestos (e.g. cable installers) as well as those involved in asbestos removal work.

Training must include detailed information on:

- ▶ recognising asbestos;
- ▶ how asbestos can affect your health;
- ▶ the added dangers of smoking;
- ▶ the uses and likely locations for asbestos in buildings;
- ▶ what work you are allowed to do by law;
- ▶ what the law requires you to do;
- ▶ procedures to protect yourself;
- ▶ what methods to use;
- ▶ what equipment you need to do the job properly;
- ▶ how to choose, use and look after personal protective equipment;

- ▶ recognising and dealing with other dangers, such as work at height;
- ▶ decontamination of yourself and work areas;
- ▶ emergency procedures; and
- ▶ waste disposal.

Refresher training is needed every year, or more often if:

- ▶ work methods change;
- ▶ the type of equipment used changes; or
- ▶ the type of work changes a lot.

Worker exposure must be below the airborne exposure limit (control limit). The Asbestos Regulations have a single control limit for all types of asbestos of 0.1 fibres per cm^3 . A control limit is a maximum concentration of asbestos fibres in the air (averaged over any continuous 4-hour period) that must not be exceeded.

In addition, short-term exposures must be strictly controlled and worker exposure should not exceed 0.6 fibres per cm^3 of air averaged over any continuous 10-minute period using respiratory protective equipment if exposure cannot be reduced sufficiently using other means.

Respiratory protective equipment is an important part of the control regime but it must not be the sole measure used to reduce exposure and should only be used to supplement other measures. Work methods that control the release of fibres such as those detailed in the Asbestos Essentials Task Sheet (<http://www.hse.gov.uk/asbestos/essentials/index.htm>) for non-licensed work should be used. Respiratory protective equipment must be suitable, must fit properly and must ensure that worker exposure is reduced as low as is reasonably practicable.

Further information

A Comprehensive Guide to Managing Asbestos in Premises HSG 227, HSE Books, 2002, ISBN 978017623815. <http://www.hse.gov.uk/pubns/books/hsg227.htm>

Approved Code of Practice Work with Materials containing Asbestos L143, HSE Books, 2006, ISBN 978 0 7176 6206 0. <http://www.hse.gov.uk/pubns/books/l143.htm>

Asbestos Essentials HSG 210 (third edition), HSE Books, 2012, ISBN 9780717665037. <http://www.hse.gov.uk/pubns/books/hsg210.htm>

Asbestos Essentials task sheets are available on the Asbestos Essentials area of the HSE website <http://www.hse.gov.uk/asbestos/essentials/index.htm>

Asbestos Kills: A Quick Guide to Protecting Yourself INDG418, HSE Books, ISBN 978 0 7176 6271 5. <http://www.hse.gov.uk/pubns/indg418.pdf>

Asbestos: The Analysts' Guide for Sampling, Analysis and Clearance Procedures HSG 248, ISBN 978 0 7176

2875 9, HSE Books, 2005, <http://www.hse.gov.uk/pubns/books/hsg248.htm>

Asbestos: the Licensed Contractors Guide HSG 247, HSE Books, 2006, ISBN 9780 717628742. <http://books.hse.gov.uk/hse/public/saleproduct.jsf?catalogueCode=9780717628742>

Asbestos: The Survey Guide HSG264 Second Edition, 2012, HSE Books, ISBN 9780717665020. <http://www.hse.gov.uk/pubns/books/hsg264.htm>

<http://www.hse.gov.uk/pubns/books/l127.htm>

Managing asbestos in buildings A brief guide INDG223(rev5) 2012, HSE Books, ISBN 9780717664870. <http://www.hse.gov.uk/pubns/indg223.htm>

15.35.4 Corporate Manslaughter and Corporate Homicide Act 2007

The Act creates a new statutory offence of corporate manslaughter which will replace the common law offence of manslaughter by gross negligence where corporations and similar entities are concerned. In Scotland the new offence will be called 'corporate homicide'. An organisation will have committed the new offence if it:

- ▶ owes a duty of care to another person in defined circumstances;
- ▶ there is a management failure by its senior managers;
- ▶ it amounts to a gross breach of that duty resulting in a person's death.

On conviction the offence will be punishable by an unlimited fine and the courts will be able to make remedial orders requiring organisations to take steps to remedy the management failure concerned. It is important to note that the Act does not create a new individual liability. Individuals may still be charged with the existing offence of manslaughter by gross negligence. Crown immunity will not apply to the offence, although a number of public bodies and functions will be exempt from it (in defined circumstances). The Act came into force on 6 April 2008. Available at: <http://www.legislation.gov.uk/ukpga/2007/19/contents>

15.35.5 Electrical Equipment (Safety) Regulations 1994

These Regulations came into force in January 1995 and relate to the supply of electrical equipment with a working voltage between 50 and 1000 volts and are made under the Consumer Protection Act 1987. They apply to suppliers, which include both landlords and letting agents.

The Regulations apply to all mains voltage household electrical goods and require them to be safe so that there is no risk of injury or death to humans or pets,

or risk of damage to property. They do not apply to fixed electrical wiring and built-in appliances like central heating systems. The Regulations also require that instructions be provided where safety depends on the user being aware of certain issues and equipment should be labelled with the CE marking.

There are other electrical consumer Regulations, like The Plugs and Sockets etc. (Safety) Regulations 1994 and the Low Voltage Electrical Equipment (Safety) Regulations 1989.

Available at: <http://www.legislation.gov.uk/ukxi/1994/3260/made>

15.35.6 The Equality Act 2010 and (Disability) Regulations 2010

The Equality Act 2010 defines a person as disabled if they have a physical or mental impairment that has a substantial and long-term adverse effect on a person's ability to carry out normal day-to-day activities; such as reading, writing, using the telephone, having a conversation and travelling by public transport.

The key thing is not the impairment but its effect. Some people don't realise that impairments such as migraines, dyslexia, asthma and back pain can count as a disability if the adverse effect on the individual is substantial and long-term. Some conditions automatically count as disabilities for the purposes of The Equality Act 2010, from the point of first diagnosis – these are cancer, HIV and multiple sclerosis (MS).

It is discrimination to treat a disabled person unfavourably because of something connected with their disability (e.g. a tendency to make spelling mistakes arising from dyslexia). This type of discrimination is unlawful where the employer or other person acting for the employer knows, or could reasonably be expected to know, that the person has a disability.

Public authorities and public, private or voluntary organisations carrying out public functions have a new **Equality Duty**. In summary, those subject to the duty have due regard to the need to:

Eliminate unlawful discrimination, harassment and victimisation and other conduct prohibited by the Act.

- ▶ Advance equality of opportunity and foster good relations between people who share a protected characteristic and those who do not.

Employers are required to make reasonable adjustments to jobs and workplaces for disabled workers. These may include:

- ▶ adjustments to the workplace to improve access or layout;
- ▶ giving some of the disabled person's duties to another person;
- ▶ transferring the disabled person to fill a vacancy;

- ▶ changing the working hours, e.g. flexi-time, job-share, starting later or finishing earlier;
- ▶ time off, e.g. for treatment, assessment, rehabilitation;
- ▶ training for disabled workers and their colleagues;
- ▶ getting new or adapting existing equipment;
- ▶ modifying instructions or procedures;
- ▶ improving communication, e.g. providing a reader or interpreter;
- ▶ providing alternative work (a last resort).

If a disabled person expects an employer to make a reasonable adjustment, they will need to provide the employer with enough information to carry out that adjustment. An employer must not disclose confidential details without explicit consent.

The Equality Act 2010 (Disability) Regulations 2010 came into force in August 2010. These Regulations re-enact with amendments provisions which were previously made under the Disability Discrimination Act 1995 (c.50) and which are revoked by Regulation 15 of these Regulations.

Part 2 contains provisions which supplement those in the Act about when a person is disabled for the purposes of that Act. Regulation 3 excludes from the scope of the definition of disability addictions (other than those medically caused). Regulation 4 excludes certain conditions from being impairments for the purposes of the Act. Regulation 5 provides that severe disfigurements consisting of tattoos and certain body piercings are not to be treated as having a substantial adverse effect on a person's ability to carry out normal day-to-day activities. Regulation 6 contains provision for assessing the ability of a child under six years of age to carry out normal day-to-day activities. Regulation 7 deems a person who is certified by a consultant ophthalmologist as blind, severely sight-impaired, sight-impaired or partially sighted to be a disabled person. The various terms used in this provision reflect the fact that the terminology used in the certificates by consultant ophthalmologists has changed over time.

In Part 3, Regulation 8 sets out things which are to be treated as auxiliary aids or services for the purposes of paragraphs 2 to 4 of Schedule 4 to the Act.

Part 4 contains provisions about reasonable adjustments to physical features of premises. Regulation 9 provides that it is not reasonable for a provider of services, a public authority carrying out its functions or an association to have to remove or alter a physical feature which was provided in or in connection with a building to assist with access to the building or to use facilities and satisfies the design standard. The Schedule to these Regulations provides details of how to determine whether the design standard is satisfied.

Regulation 10 sets out the circumstances in which a relevant landlord is taken to have withheld consent for the purposes of Schedule 21 to the Act. Regulations

and 12 set out circumstances in which a relevant landlord is taken to have withheld consent for the purposes of Schedule 21 to the Act unreasonably and reasonably respectively.

Regulation 13 sets out circumstances in which a restriction imposed by a landlord to consent to an action is reasonable for the purposes of Schedule 21 to the Act.

Regulation 14 provides modifications to Schedule 21 to the Act where the occupier occupies premises under a tenancy.

Available at: <http://www.legislation.gov.uk/ukpga/2010/15/contents>

Regulations available: http://www.legislation.gov.uk/ukpga/2010/2128/pdfs/ukxi_20102128_en.pdf

15.35.7 Gas Appliances (Safety) Regulations 1995

The 1992 Regulations required the gas appliances and fittings to which they applied to conform with the essential requirements detailed in Schedule 3 and to be safe when normally used. Series-manufactured products were also required to undergo EC type-examination together with one of a number of prescribed options for production control, at the choice of the manufacturer, certified by third-party notified bodies (regulations 8, 15-18, 20-23). Single appliances or small numbers may be subject to EC unit verification (Regulations 8 and 19). The 1992 Regulations are revoked.

The 1995 Regulations re-enact those requirements (with certain minor amendments) (regulations 4(1)(c) and 4(5), List 23).

Second-hand appliances are not covered by these Regulations but they retain in force, for second-hand gas appliances only, the Gas Cooking Appliances (Safety) Regulations 1989 and the Heating Appliances (Fireguard) (Safety) Regulations 1991 (regulation 1(3)).

The Gas Appliance Regulations cover the safety standards on new gas appliances which have to:

- ▶ satisfy safety and efficiency standards;
- ▶ undergo type-examination and supervision during manufacture;
- ▶ carry the CE mark and specified information;
- ▶ be accompanied by instructions and warnings in the language of destination.

Available at: <http://www.legislation.gov.uk/uk/1995/1629/contents/made>

15.35.8 Gas Safety (Installation and Use) Regulations 1998

The Installation and Use Regulations place duties on gas consumers, installers, suppliers and landlords to ensure that:

- ▶ only competent people work on gas installations;
- ▶ no one is permitted to use suspect gas appliances;
- ▶ landlords are responsible, in certain cases, to make sure that fittings and flues are maintained;
- ▶ with the exception of room-sealed appliances there are restrictions on gas appliances in sleeping accommodation;
- ▶ instantaneous gas water heaters must be room-sealed or fitted with appropriate safety devices.

Available at: <http://www.legislation.gov.uk/ukxi/1998/2451/contents/made>

From April 2009 a new gas installer registration scheme replaced the former CORGI gas scheme. The new 'Gas Safe Register' is run by the Capita Group Plc on behalf of the HSE. A Gas Safety engineer must be used for any type of gas work, including installation, maintenance and servicing. See: <http://www.gassaferegister.co.uk/default.aspx>

See: Safety in the installation and use of gas systems and appliances: Gas Safety (Installation and use) Regulations 1998 Approved Code of Practice and guidance. L56 (Fourth edition), HSE Books 2013 ISBN 9780717666171. <http://www.hse.gov.uk/pubns/priced/l56.pdf>

15.35.9 Health and Safety (Offences) Act 2008

The Health and Safety (Offences) Act 2008 increases penalties and provides courts with greater sentencing powers for those who flout health and safety legislation.

The Act raised the maximum penalties that can be imposed for breaching health and safety regulations in the lower courts from £5,000 to £20,000 and the range of offences for which an individual can be imprisoned has also been broadened.

The Act amended Section 33 of the HSW Act 1974, and raises the maximum penalties available to the courts in respect of certain health and safety offences. It received Royal Assent on 16 October 2008 and came into force in January 2009.

Available at: <http://www.legislation.gov.uk/ukpga/2008/20/contents>

15.35.10 Control of Lead at Work Regulations 2002

These Regulations came into force in November 2002 and impose requirements for the protection of employees who might be exposed to lead at work and others who might be affected by the work. The Regulations:

- ▶ require occupational exposure levels for lead and lead alkyls;
- ▶ require blood-lead action and suspension levels for women of reproductive capacity and others,

- ▶ re-impose a prohibition for women of reproductive capacity and young persons in specified activities;
- ▶ require an employer to carry out a risk assessment;
- ▶ require employers to restrict areas where exposures are likely to be significant if there is a failure of control measures;
- ▶ impose requirements for the examination and testing of engineering controls and RPE and the keeping of PPE;
- ▶ impose new sampling procedures for air monitoring;
- ▶ impose requirements in relation to medical surveillance;
- ▶ require information to be given to employees;
- ▶ require the keeping of records and identification of containers and pipes.

Available at: <http://www.legislation.gov.uk/uksi/2002/2676/contents/made>

15.35.11 Occupiers Liability Acts 1957 and 1984 – Civil Law

The 1957 Act concerns the duty that the occupier of premises has towards visitors in relation to the condition of the premises and to things which have or have not been done to them. The Act imposes the following:

- ▶ there is a duty to take reasonable care to see that a visitor is reasonably safe in using the premises for the purpose for which they were invited or permitted by the occupier to be there;
- ▶ the common duty of care will differ depending on the visitor, so a greater duty is owed to children;
- ▶ an occupier can expect that a person in the exercise of their trade or profession will appreciate and guard against normal risks, for example a window cleaner;
- ▶ no duty of care is owed to someone exercising a public right of way.

The 1984 Act extends the duty of care to persons other than visitors, i.e. trespassers. The occupier has to take reasonable care in all the circumstances to see that non-visitors do not get hurt on the premises because of its condition or the things done or not done to it. The occupier must cover perceived dangers and must have reasonable grounds to know that the trespassers may be in the vicinity.

Available at: <http://www.legislation.gov.uk/ukpga/Etc/2/5-6/31/contents>

<http://www.legislation.gov.uk/ukpga/1984/3/contents>

15.35.12 Personal Protective Equipment Regulations 2002

These Regulations relate to approximation of the laws of EU member states. They place duties on persons who place PPE on the market to comply with certain standards. These requirements are that PPE must satisfy the basic health and safety requirements which are applicable to that class or type of PPE, the

appropriate conformity assessment procedures must be carried out. CE marking must be correctly affixed and the PPE must not compromise the safety of individuals, domestic animals or property when properly maintained and used.

Available at: <http://www.legislation.gov.uk/uksi/2002/1144/contents/made>

15.35.13 Control of Pesticides Regulations 1986 as amended

These Regulations made under the Food and Environment Protection Act 1985 all came into force by 1 January 1988. The Regulations apply to any pesticide or any substance used generally for plant control and protection against pests of all types, including anti-fouling paint used on boats. They do not apply to substances covered by other Acts like the Medicines Act 1968, The Food Safety Act 1990, those used in laboratories and a number of other specific applications. No person may advertise, sell, supply, store, or use a pesticide unless it has received ministerial approval and the conditions of the approval have been complied with. The approval may be experimental, provisional or full, and the Minister has powers to impose conditions.

The Regulations also cover the need for users to be competent and have received adequate information and training. Certificates of competence for working under the supervision of a person with a certificate are required where pesticides approved for agricultural use are used commercially.

Defra issued a consultation document in August 2007 which covers the update of these Regulations as follows.

At present there are four Regulations (plus their amendments) to control and monitor marketing and use of pesticides in England and Wales.

- ▶ The Control of Pesticides Regulations 1986 and its amendment in 1997;
- ▶ The Plant Protection Products Regulations 2005 and its amendment in 2006;
- ▶ The Plant Protection Products (Basic Conditions) Regulations 1997;
- ▶ The Plant Protection Products (Fees) Regulations 2007.

Defra's proposal is to consolidate these four Regulations (plus amendments) into one Regulation.

Available at: <http://www.legislation.gov.uk/uksi/1986/1510/contents/made>

15.35.14 Pressure Systems Safety Regulations 2000 (PSSR)

These Regulations came into effect in February 2000 and replace the Pressure Systems and Transportable Gas Containers Regulations 1989. Transportable gas

ainers are covered by the Use of Transportable Pressure Receptacles Regulations 1996 (SI 1996, No. 193).

The aim of PSSR is to prevent serious injury from the hazard associated with stored energy as a result of a pressure system or one of its parts failing. The Regulations cover:

- ▶ steam at any pressure;
- ▶ gases which exert a pressure in excess of 0.5 bar above atmospheric pressure;
- ▶ fluids which may be mixtures of liquids, gases and vapours where the gas or vapour phase may exert a pressure in excess of 0.5 bar above atmospheric pressure.

With the exception of scalding from steam, the Regulations do not consider the effects of the hazardous contents being released following failure. The stored contents are of concern where they can accelerate wear and cause more rapid deterioration and an increased risk of failure.

Available at: <http://www.legislation.gov.uk/uk/2000/128/contents/made>

5.26.15 Road Traffic Acts 1988 and 1991

Most rules from Road Traffic Acts 1988 and 1991 are contained in the Highway Code.

Many references to legislation can be found abbreviated throughout the Code. The Code contains a table of legislation under the 'Road User and the law' section. It is not intended to be a comprehensive guide, but a guide to some of the important points of law. For the precise wording of the law, please refer to the various Acts and Regulations (as amended) indicated in the Code.

Most of the provisions apply on all roads throughout Great Britain, although there are some exceptions. The definition of a road in England and Wales is 'any highway and any other road to which the public has access and includes bridges over which a road passes' (Road Traffic Act (RTA) 1988 sect 192(1)). In Scotland, there is a similar definition which is extended to include any way over which the public have a right of passage (Road (Scotland) Act (R(S)A) 1984 sect 151(1)).

It is important to note that references to 'road' therefore generally include footpaths, bridleways and cycle tracks, and many roadways and driveways on private land (including many car parks). In most cases, the law will apply to them and there may be additional rules for particular paths or ways. Some serious driving offences, including drink-driving offences, also apply to all public places, for example public car parks.

This Highway Code applies to England, Scotland and Wales. The Highway Code is essential reading for everyone who uses the public highways, which is virtually the whole population.

The most vulnerable road users are pedestrians, particularly children, older or disabled people, cyclists, motorcyclists and horse riders. It is important that all road users are aware of the Code and are considerate towards each other. This applies to pedestrians as much as to drivers and riders. Many of the rules in the Code are legal requirements, and if you disobey these rules you are committing a criminal offence. You may be fined, given penalty points on your licence or be disqualified from driving. In the most serious cases you may be sent to prison. Such rules are identified by the use of the words 'MUST'. In addition, the rule includes an abbreviated reference to the legislation which creates the offence.

Although failure to comply with the other rules of the Code will not, in itself, cause a person to be prosecuted. The Highway Code may be used in evidence in any court proceedings under the Traffic Acts to establish liability. This includes rules which use advisory wording such as 'should/should not' or 'do/do not'. Knowing and applying the rules contained in The Highway Code could significantly reduce road casualties. Cutting the number of deaths and injuries that occur on our roads every day is a responsibility we all share. The Highway Code can help us discharge that responsibility.

The Highway Code covers:

- ▶ Rules for pedestrians;
 - ▶ Rules for animals;
 - ▶ Rules for cyclists;
 - ▶ Rules for motorcyclists;
 - ▶ Rules for drivers and motorcyclists;
 - ▶ General rules, techniques and advice for all drivers and riders;
 - ▶ Using the road;
 - ▶ Road users requiring extra care;
 - ▶ Driving in adverse weather conditions;
 - ▶ Waiting and parking;
 - ▶ Motorways;
 - ▶ Breakdowns and accidents;
 - ▶ Road works;
 - ▶ Railway level crossings;
 - ▶ Tramways;
 - ▶ Light signals controlling traffic;
 - ▶ Signals to other road users;
 - ▶ Signals by authorised persons;
 - ▶ Traffic signs;
 - ▶ Road markings;
 - ▶ Vehicle markings;
 - ▶ Annexes
1. You and your bicycle
 2. Motorcycle licence requirements
 3. Motor vehicle documentation and learner driver requirements
 4. The road user and the law
 5. Penalties
 6. Vehicle maintenance, safety and security
 7. First-aid on the road
 8. Safety code for new drivers
- ▶ Supplementary Notes.

Here we have picked out the legal requirements from the Code applying to Drivers of motor vehicles and motorcyclists as an example of the Code. All those who drive for work should be familiar with the latest copy of the code, which is available from all good book stores and at <https://www.gov.uk/browse/driving/highway-code>

- 1. Vehicle condition.** You must ensure your vehicle and trailer comply with the full requirements of the Road Vehicles (Construction and Use)(CUR) Regulations and Road Vehicles Lighting Regulations.
- 2. Fitness to drive.** Make sure that you are fit to drive. You must report to the Driver and Vehicle Licensing Agency (DVLA) any health condition likely to affect your driving. Law RTA 1988 sect 94.
- 3. Vision.** You must be able to read a vehicle number plate, in good daylight, from a distance of 20 metres (or 20.5 metres where the old style number plate is used). If you need to wear glasses for contact lenses to do this, you must wear them at all times while driving. The police have the power to require a driver to undertake an eyesight test. Laws RTA 1988 sect 96 & MVIDLR reg 40 & sch 8.
- 4. You must not drive with a breath alcohol level higher than 35 microgrammes/100 millilitres of breath or a blood alcohol level of more than 80 milligrammes/100 millilitres of blood.** Law RTA 1988 sects 4, 5 & 11(2).
- 5. You must not drive under the influence of drugs or medicine.** Law RTA 1988 sect 4.
- 6. Vehicle towing and loading.** As a driver:
 - (a). you must not tow more than your licence permits. If you passed a car test after 1 Jan 1997 you are restricted on the weight of trailer you can tow;
 - (b). you must not overload your vehicle or trailer;
 - (c). You must secure your load and it must not stick out dangerously. Laws CUR reg 100 & MVIDLR reg 43.
- 7. Seat belts and child restraints.** You must wear a seat belt in cars, vans and other goods vehicles if one is fitted. Adults, and children aged 14 years and over, must use a seat belt or child restraint, where fitted, when seated in minibuses, buses and coaches. Laws RTA 1988 sects 14 & 15. Motor Vehicle (Wearing of Seat Belts)(MVWSB) Regulations, MVWSB by Children in Front Seats Regulations & MVWSB(Amendment)R.
- 8. The driver must ensure that all children under 14 years of age in cars, vans and other goods vehicles wear seat belts or sit in an approved child restraint where required. If a child is under 1.35 metres (approx 4 feet 5 inches) tall, a baby seat, child seat, booster seat or booster cushion be used suitable for the child's weight and fitted to the manufacturer's instructions.**
- 9. A rear-facing baby seat must not be fitted into a seat protected by an active frontal airbag, as in a crash it**

can cause serious injury or death to the child. Laws RTA 1988 sects 14 & 15, MVWSB(R, MVWSB(CF)R & MVWSB(A)R.

15.35.16 The Health and Safety (Sharp Instruments in Healthcare) Regulations 2013

The Health and Safety (Sharp Instruments in Healthcare) Regulations came into force on 11 May 2013. Northern Ireland introduced equivalent regulations on the same date.

The new regulations were introduced to implement a European Directive. They supplement the existing health and safety legislation that already requires employers across all sectors to take effective action to control the risk from sharps injuries.

Employers and contractors working in the healthcare sector are required to:

- ▶ Have effective arrangements for the safe use and disposal (including using "safer sharps" where reasonably practicable, restricting the practice of recapping of needles and placing sharps bins close to the point of use);
- ▶ Provide the necessary information and training to workers;
- ▶ Investigate and take action in response to work-related sharps injuries.

Guidance for healthcare employers and employees, HSIS7, HSE, 2013 at www.hse.gov.uk/pubns/hsis7.htm.

15.35.17 Smoke-free legislation

Five sets of smoke-free Regulations set out the detail of the smoke-free legislation. Within the UK, smoking law is a devolved issue and therefore similar legislation has been enacted in all parts of the UK.

The smoke-free law has been introduced to protect employees and the public from the harmful effects of second-hand smoke.

Key points are:

- ▶ It is now against the law to smoke in virtually all "enclosed" and "substantially enclosed" public places and workplaces.
- ▶ Public transport and work vehicles used by more than one person must be smoke-free at all times.
- ▶ No smoking signs must be displayed in all smoke-free premises and vehicles.
- ▶ Staff smoking rooms and indoor smoking areas are no longer allowed, so anyone who wants to smoke has to go outside.
- ▶ Managers of smoke-free premises and vehicles have legal responsibilities to prevent people from smoking.

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Environmental, international and other aspects of health and safety

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This chapter covers the following learning objectives:

1. Describe the roles and powers of the environmental enforcement agencies
2. Identify the reasons for implementing an Environmental Management System
3. Explain the principles and practice of environmental impact assessment
4. Outline the nature and sources of international health and safety management information
5. Explain the various accident compensation systems that are operated globally
6. Outline the precautions to be taken when travelling abroad
7. Identify basic health and safety issues in the home
8. Identify the key principles of safe cycling

16.1 Introduction

This chapter covers some topics that are no longer in the current syllabus for the NEBOSH National General Certificate but may well be useful to many health and safety managers. These include environmental considerations and international issues.

Additional sections on health and safety in the home and safe cycling have also been included.

16.2 Environmental considerations

The current NEBOSH National General Certificate no longer includes general environmental considerations other than waste disposal. However, many health and safety managers also have an "environmental" responsibility. This section attempts to give some background information on environmental issues. NEBOSH also offers a Certificate in Environmental Management and a Diploma in Environmental Management that covers these issues in much more detail.

Organisations must also be concerned with aspects of the environment. There will be an interaction between the health and safety policy and the environmental policy which many organisations are now developing. Many of these interactions will be concerned with good practice, the reputation of the organisation within the wider community and the establishment of a good health and safety culture. The health and safety data sheet, used for a COSHH assessment, also contains information of an environmental nature covering ecological information and disposal considerations. An important component in the management of environmental considerations is the Environmental Management System (EMS).

The Environmental Management System should cover all aspects of an organisation's activities, products and services that could interact with the environment. Such aspects or elements include:

- ▶ the raw materials used and their source;
- ▶ by-products from processes;
- ▶ waste material produced;
- ▶ the energy and water used;
- ▶ emissions to air and water;
- ▶ lifespan of products and end-of-life disposal;

- ▶ packaging and transport issues; and
- ▶ environmental hazards associated with any materials used.

Environmental assessments need to be reviewed if there are significant changes to some of the elements, such as changes in raw material source or change of product. However, changes in plant or location, the availability of new processes and technologies or recycling opportunities could also be reasons. In addition, new legislation or market and public pressures, evidence of environmental damage or accidents could also prompt a review. Reviews of assessments may also arise as a result of audits or from annual reviews as part of an EMS or striving for continuous improvement.

There are three environmental issues which place statutory duties on employers and are directly related to the health and safety function. These are:

- ▶ air pollution;
- ▶ water pollution;
- ▶ waste disposal.

The statutory duties are contained in the Environmental Protection Act (EPA) 1990 and several of its subsequent Regulations. The Act is enforced by various state agencies (the Environment Agency, local authorities) and these agencies have very similar powers to the HSE (e.g. enforcement, prohibition notices and prosecution). In addition to serving notices, they can enter premises at any reasonable time or at any time if they have reason to believe that there is immediate risk of serious pollution to the environment. They may be accompanied by other authorised persons or a police constable and take with them any equipment or materials required to exercise their powers.

Once there they can make any examinations or inspections necessary and take samples, photographs, measurements and copies of documents. They may cause premises or parts of premises to be left undisturbed and ask for articles to be dismantled, tested or rendered harmless. Articles and substances may be taken and examined or ensured that they are secure from tampering and available as evidence. Any persons involved are required to offer assistance or facilities as necessary and may be required to answer questions and sign a declaration that their statements

proceedings. The end result may be the initiation of legal proceedings.

Environmental managers should have a clear understanding of the harm that can be done to a business when regulatory controls are breached. The potential liabilities arising from non-compliance with environmental regulatory controls can be significant leading to criminal prosecutions by the enforcing authorities or through private prosecutions. The results of a successful prosecution could result in:

- ▶ the significant fines that can be given for serious breaches of the law;
- ▶ the potential for prison sentences and for personal prosecution for directors and managers;
- ▶ administrative sanctions including serving notices such as revocation notices, suspension notices and enforcement notices;
- ▶ orders requiring works to be undertaken to prevent pollution;
- ▶ award of clean-up costs for rectifying environmental damage;
- ▶ loss of value of property, land or a business;
- ▶ civil liability, resulting in claims for damages or injunctions;
- ▶ adverse publicity and its effect on relations with key stakeholders, including shareholders, customers, neighbours, insurers and banks; and
- ▶ insurance issues due to the fact that most standard business policies exclude liability for environmental damage unless sudden and unforeseen.

The Act is divided into nine parts but this chapter will only be concerned with Part 1 (the control of pollution in the air, water or land) and Part 2 (waste disposal).

Pollution is a term that covers more than the effect on the environment of atmospheric emissions, effluent discharges and solid waste disposal from industrial processes. It also includes the effect of noise, vibration, heat and light on the environment. This was recognised in the 1996 EU Directive on Integrated Pollution Prevention and Control, and the Pollution Prevention and Control Act 1999 replaced the Integrated Pollution Control Regulations made under Part 1 of the EPA by extending those powers to cover waste minimisation, energy efficiency, noise and site restoration. Thus the Pollution Prevention and Control Act has now replaced Part 1 of the EPA.

The Solvents Emissions Directive (SED) has produced some tougher rules on the use of solvents in industry. Local authorities and the Environment Agency are beginning to incorporate SED provisions into Integrated Pollution Prevention and Control Permits (IPPCP). Organisations that use solvents on an industrial scale need an IPPCP to operate.

The Control of Pesticides Regulations have been in place since 1986 and the Department of Food and



Figure 16.1 Example of industrial air pollution

Rural affairs (Defra) are proposing to consolidate these Regulations with three Plant Protection Products Regulations to form one set of integrated Regulations (see Chapter 15 for more information).

The Environmental Damage (Prevention and Remediation) Regulations came into force in 2009 (in England only) to implement the EU Environmental Liability Directive. They cover environmental damage caused by economic activity of any public or private organisation. Under the Regulations such organisation are obliged to report to the Environment Agency any activity that has or could cause environmental damage. Such damage could be to protected species, natural habitats, surface or ground water, sites of special scientific interest or land in general. If the Environment Agency considers that such damage has occurred, it can serve a remediation notice on the organisation outlining any remedial action required. If the organisation fails to remedy the problem, the Environment Agency is empowered to undertake the remediation itself and order any associated costs from the organisation.

The Regulatory Enforcement and Sanctions Act has given the Environment Agency new powers to enforce environmental law using civil sanctions rather than criminal prosecutions. The new powers include the imposition of fixed and variable fines and prohibition notices to prevent the continuation of an activity until compliance has been assured. Other powers include the use of compliance notices that require remedial action to be taken; restoration notices that require the

restoration of particular situation and enforcement undertakings. These allow corrective actions to be undertaken before any enforcement is taken. Appeals against any of these measures are possible to an independent tribunal.

16.2.1 Air pollution

The most common airborne pollutants are carbon monoxide, benzene, 1,3-butadiene, sulphur dioxide, nitrogen dioxide and lead. Air pollution is monitored by Integrated Pollution Prevention and Control (IPPC). This is a system which extends the Integrated Pollution Control (IPC) system established by Part 1 of the EPA by introducing three tiers of pollution control.

- ▶ **Regime A1 processes**, which are certain large-scale manufacturing processes with a potential to cause serious environmental damage to the air, water or the land. In England and Wales this is enforced by the Environment Agency. In Scotland there is a parallel system enforced by the Scottish Environmental Protection Agency.
- ▶ **Regime A2 processes**, which produce emissions to air, water and land with a much smaller potential to pollute than regime A1 processes. The local authority (LA-IPPC) is the regulator for these processes.
- ▶ **Part B processes**, which may be classified as those from less polluting industries with only emissions released to air being subject to regulatory control. For such processes local authorities are the enforcing body through Environmental Health Officers. The system is known as Local Air Pollution Control (LAPC) in Northern Ireland and Scotland. In England and Wales, it is known as Local Air Pollution Prevention and Control (LAPPC).

This division has led to some anomalies in that some Part A processes create less pollution than some Part B processes. However, the grouping of three pollution destinations under one arrangement tends to a more holistic approach. The aim of IPPC is to control pollution of the whole environment under a single enforcement system and it offers three principles to prevent and control pollution. These are:

- ▶ The 'Best Practicable Environmental Option (BPEO)' which considers both the environmental and economic costs and benefits of the possible options available to deal with the pollution problem. BPEO is a legal requirement for Part A processes. It normally requires a technical solution.
- ▶ The 'Best Available Techniques' are similar to BATNEEC (Best Available Techniques Not Entailing Excessive Cost) introduced by the EPA to minimise the overall environmental impact of a process. Part B processes only need to satisfy the BATNEEC requirement which is not restricted to pollution control technology but can include employee

training and competence and building design and maintenance.

- ▶ 'As low as reasonably practicable' applies the same test to an environmental problem as is applied to a health and safety problem. Any high or unacceptable environmental risk should be reduced to as low as is reasonably practicable.

The EPA proscribes certain listed substances from being released to air, water or land. All proscribed processes must have authorisation. An operator of a proscribed process (such as a vehicle spray booth) must apply to the Environment Agency for prior authorisation to operate the process. If the application is granted, the operator must monitor emissions and report them to the Environment Agency on a yearly basis. The Agency has the power to revoke the authorisation, enforce the terms of the authorisation or prohibit the operation of the process. Further information on the authorisation process is given in Chapter 15.

The causes, principles of formation and consequences of four common air pollution effects are as follows:

- ▶ **The greenhouse effect** is caused by the emission of, and increase in, atmospheric levels of specific pollutants such as carbon dioxide, methane and refrigerant gases. Greenhouse gases trap long wave thermal radiation causing a warming effect upon the atmosphere. As concentrations increase this warming effect increases to the point where there is an imbalance between incoming short wave radiation and outgoing long wave radiation leading to net global warming of the atmosphere. The consequences of this warming include *climate change*, possible sea level rises and effects on agricultural and natural ecosystems.
- ▶ **Stratospheric ozone depletion** is caused by emissions of volatile organic compounds containing halogens which have a long half-life in the atmosphere – such as refrigerants, carbon tetrachloride, halons and other chlorinated solvents. The Earth is protected by a natural layer of ozone that absorbs incoming UV radiation. Natural ozone formation is by the process of photo-dissociation of oxygen molecules and reformation as ozone. Chlorine (and other halogen) atoms catalyse the destruction of ozone back to oxygen molecules and are not consumed in the reaction. Therefore, one atom of chlorine can destroy many ozone molecules. The main consequence is an increased level of cell and genetic damage, ultimately leading to skin cancer and crop damage.
- ▶ **Acid rain** is caused by the emission of gases that form acidic compounds in the presence of water or water vapour, such as sulphur dioxide, hydrogen chloride and nitrogen dioxide. These acid-forming gases dissolve in water in the atmosphere to produce acids such as sulphurous or sulphuric acid. When the acidic water forms raindrops or mist

and reaches the ground, it affects the acidity (pH) balance in upland ecosystems, leading to the release of toxic metals into surface run-off with subsequent toxic effects on vegetation, aquatic invertebrates and fish. Acid rain can also damage materials such as limestone in buildings, and cause corrosion to metals such as galvanised steel.

Photochemical smog is associated with the emission of volatile organic compounds such as solvents, petrol vapour and other compounds into a warm atmosphere in the presence of sunlight. The emissions react with each other in the presence of ultraviolet radiation and reactive gases such as nitrogen dioxide to create complex mixtures of secondary pollutants and ozone, many of which cause irritation to respiratory systems and degrade materials such as rubber. On a warm day, levels of photochemical air pollutants accumulate in the atmosphere around larger cities to create a brown photochemical haze.

16.2.2 Water pollution

Pollution of rivers and other water courses can produce very serious effects on the health of plants and animals which rely on that water supply. The Environment Agency is responsible for coastal waters, inland fresh water and groundwaters (known as 'controlled waters'). The EC Groundwater Directive seeks to protect groundwater from pollution since this is a source of drinking water. Such sources can become polluted by leakage from industrial soakaways. Discharges to a sewer are controlled by the Water Industry Act that defines trade effluent and those substances which are prohibited from discharge (e.g. petroleum spirit) and the Water Resources Act that covers discharge consent to controlled waters. It is an offence to pollute any controlled waters or sewage system. If hazardous substances are being used by the organisation, safety data sheets give advice on the safe disposal of any residues that remain after the particular process has been completed.

The local water company has a right to sample discharges into its sewers because it is required to keep a public trade effluent register. There are two lists of proscribed substances which can only be discharged into a public sewer with the permission of the water company.

Finally, if oil is stored on the premises, a retaining bund wall should surround the oil store. This will not only ensure that any oil leakage is contained but will also stop the contamination of groundwater by fire-fighting foam in the event of a fire. This is a requirement of the Control of Pollution (Oil Storage) Regulations 2001.



(a)



(b)

Figure 16.2 (a) Water pollution from an oil spillage, (b) water pollution from plastic and other solid waste

16.2.3 Waste management – environmental permits

The UK produces in excess of 330 million tonnes of waste annually – a quarter of which is from households and business. The remainder derives from construction and demolition, sewage sludge, farm waste and spoils from mines and dredging of rivers. In an attempt to manage this waste, the Environmental Permitting (England and Wales) Regulations have been introduced. These Regulations are one-third of the length of the previous legislation and replace over 40 statutory instruments. They have created one single regulatory system by streamlining and integrating Waste Management Licensing and Pollution Prevention and Control. Environmental permits will provide industry, regulators and others with a single permitting and compliance system and could include those systems for:

- ▶ discharge consenting;
- ▶ groundwater authorisations;
- ▶ water abstraction and impoundment;
- ▶ radioactive substances regulation;
- ▶ licensing of some waste carriers and brokers.

The Environmental Permitting Regime ('the Regime') requires operators to obtain permits for some facilities, the registration of exemptions for other facilities and ongoing supervision by regulators. The regulator may be the Environment Agency or the local authority depending on the type of process involved.

The aim of the Regime is to:

- ▶ protect the environment;
- ▶ deliver permitting and compliance effectively and efficiently in a way that provides increased clarity and minimises the administrative burden on both the regulator and the operators of facilities;
- ▶ encourage regulators to promote best practice in the operation of regulated facilities;
- ▶ continue to fully implement European legislation.

An Environmental Permit is required for any of the following:

- ▶ an installation (which carries out the activities listed in Schedule 1 to the Regulations and any activities that are technically linked);
- ▶ a waste operation; or
- ▶ a mobile plant (carrying out either one of the Schedule 1 activities or a waste operation).

The collective term used in the EP Regulations for these installations, waste operations and mobile plant is 'regulated facility'. There may be more than one regulated facility on the same site. In such cases there are arrangements in the EP Regulations to allow all such facilities to be regulated by the same regulator and to flow, in many cases, for a single permit. It is an offence under the Regulations to operate a regulated facility without a permit. More information on environmental permits is available in Chapter 15.

The single environmental permit will combine and streamline the previous waste management licence (WML) and pollution prevention and control (PPC) systems. All existing WML or PPC permits will automatically become environmental permits. All organisations who handle waste must check that they have the correct environmental permits in place to operate legally. The environmental permit outlines the amount and types of waste that the organisation can accept. Recently a company was fined for operating a waste transfer station without the necessary permits in place.

16.2.4 Waste disposal

This has been covered in Chapter 13. Some of the topics covered in Chapter 13 will be covered here in more detail.

Prior to its collection for disposal elsewhere, a producer of waste should take the following measures to reduce the risk associated with its storage:

- ▶ segregate the waste by separating materials with incompatibility risks;

- ▶ contain the waste to prevent escape by the choice of suitable containers;
- ▶ provide bunding arrangements for liquid wastes;
- ▶ provide secure waste sites and protection from the weather, pests and scavengers;
- ▶ locate sites away from buildings, watercourses or other potential sites where environmental damage may be caused;
- ▶ provide proper labelling and site management including record keeping, supervision and site inspections; and
- ▶ ensure that emergency plans are in place.

The decline in landfill capacity, particularly for hazardous wastes, and the rapid rise of disposal costs is a topical issue for environmental managers.

In addressing the varying reasons why landfill is under pressure, many candidates did include a wide range of relevant pressures, as summarised below. However, some raised only a limited number of issues, preferring instead to address possible strategies for dealing with waste, other than landfill, and hence severely limited the number of marks that were available to them.

Landfill disposal

As a waste disposal option, landfill is coming under increasing pressure and its future as the main disposal method for household, commercial and industrial waste is limited. There are environmental concerns that include the impact of methane emissions on global warming, local air pollution arising from gaseous emissions and potential safety risks from gas migration, nuisance from odours and pests and water pollution, particularly groundwater contamination from leachates. There are also natural resource concerns including the burying of materials that could otherwise be recovered or recycled. Other issues associated with landfill waste disposal are:

- ▶ the availability of suitable sites and the restriction on development of land due to concerns about health and safety;
- ▶ environmental issues for buildings on or near landfill sites;
- ▶ difficulties in obtaining permission for new sites due to the effect of environmental and local protest groups;
- ▶ economic costs including progressive rises in Landfill Tax making landfill less competitive to its alternatives;
- ▶ rising operational costs due to tighter regulation under the Pollution Prevention and Control permit system;
- ▶ tighter restrictions on disposal of some waste types under the Landfill Directive, particularly hazardous wastes, and the shortage of capacity and number of sites capable of dealing with hazardous wastes;
- ▶ the need for pre-treatment of all wastes prior to landfill disposal.

There are concerns over the liability for future environmental costs arising from landfilled waste and the levels of financial provision required to ensure sites are maintained and restored. There is also a trend in many companies towards greater minimisation and recovery of waste which are reducing requirements for disposal facilities. The effect of such measures as the Packaging Waste Regulations has encouraged higher rates of recovery.

The Waste Electrical and Electronic Equipment Regulations (WEEE)

The WEEE were briefly covered in Chapter 13. The Regulations transpose the EU Directive on waste electrical and electronic equipment into UK law. They apply, with certain exceptions, to the categories of Electrical and Electronic Equipment (EEE) specified in Schedules to the Regulations. The disposal of equipment such as computer monitors and printers are likely to be EEE within the meaning of the Regulations.

The main requirements of the Regulations are:

- ▶ All producers who put EEE on the market in the UK are responsible for financing the costs of the collection, treatment, recovery and environmentally sound disposal of WEEE from private households that is deposited at designated collection facilities (DCFs) or returned under an in-store take back service.
- ▶ All producers must join an approved compliance scheme and charges must be paid to the Environment Agency or Scottish Environment Protection Agency (SEPA) for registration of a scheme. A producer must provide a declaration of compliance, together with supporting evidence, to the appropriate Environment Agency.
- ▶ A producer must mark EEE with the crossed-out wheeled bin symbol, a producer identification mark and a date mark and must also provide information on reuse and environmentally sound treatment for each new type of EEE put on the market by that producer.
- ▶ Approved compliance schemes must register or notify each producer who is a member of that scheme with the Environment Agency. An operator of a scheme has reporting, compliance and record keeping obligations.
- ▶ There are special provisions relating to the financing obligation on users of business WEEE that arises from EEE that was put on the market in the United Kingdom before 13 August 2005.
- ▶ A person who collects or transports WEEE must ensure that reuse and recycling of that equipment, or its components, is optimised and they may refuse to handle contaminated WEEE.
- ▶ A person who treats WEEE must be an authorised treatment facility (ATF) or an exporter for the purpose of issuing evidence of compliance under

these Regulations through 'evidence notes' which may be sold to producer compliance scheme.

- ▶ There are exemptions for storing or treating WEEE for the purposes of reuse, recovery or recycling introduced under the Waste Electrical and Electronic Equipment (Waste Management Licensing) Regulations.



Figure 16.3 Electronic waste under WEE



Figure 16.4 Environmental protection commitment

Waste incineration

Incineration is a waste treatment technology that involves the combustion of waste at high temperatures and is being used to replace land disposal of waste. However, certain air pollutants may be released. These include:

- ▶ acidic gases, for example hydrogen chloride, sulphur oxides, and nitrogen oxides;
- ▶ metals such as cadmium, mercury, arsenic;
- ▶ organic substances where combustion has not been complete, e.g. dioxins, oxides of carbon, e.g. carbon monoxide and dioxide; and
- ▶ particulate matter such as silica.

The advantages of waste incineration include:

- ▶ an overall reduction in volume of waste; destruction of hazardous components, e.g. incineration of medical waste products;

- ▶ an end product ash that is sterile and non-hazardous which can be recycled, e.g. in road building;
- ▶ the generation of electricity and steam that can be sold to the regional electric grid and industrial customers and thus replace fossil fuel for energy generation; and
- ▶ the destruction of organic components of biodegradable waste that may generate landfill gases.

However there are several disadvantages which include:

- ▶ the concerns about the health effects of dioxin and furan emissions into the atmosphere;
- ▶ odour;
- ▶ public perceptions;
- ▶ increased road activity;
- ▶ high capital costs;
- ▶ stringent monitoring requirements;
- ▶ high fuel costs on starting the incineration process;
- ▶ waste inputs need to be carefully controlled since it is not suitable for all wastes (e.g. aqueous);
- ▶ difficulty in obtaining suitable sites; and
- ▶ poor maintenance can lead to performance deterioration.

16.2.5 Environmental impact assessments

Environmental impact assessments are a legal requirement in some planning applications (described in schedules to the EPA) or as part of an IPPC application. They are also an essential part of implementing an Environmental Management System (EMS) where they can help identify the impacts from associated aspects. Their use identifies the control measures that may be required to minimise environmental risk or to provide a risk rating for the purpose of prioritisation.

The Town and Country Planning (Environment Impact Assessment) Regulations 1999 require that an environmental assessment should be undertaken by a developer for specified forms of development. These are identified in Schedule 1 and Schedule 11 to the Regulations. Any development listed under Schedule 1 requires an environmental assessment and the submission of an environmental statement to the relevant planning authority. For those developments listed under Schedule 11, the planning authority may require an environmental assessment to be prepared or the developers themselves may opt to submit such an assessment, irrespective of whether the authority requires it. Environmental assessments are also required under applications for authorisations or permits in respect of 'integrated pollution control' or 'pollution prevention and control' and advice is available from planning policy guidance notes.

The types of environmental impacts which should be considered during an environmental impact assessment include:

- ▶ atmospheric, aquatic and land aspects;
- ▶ ecosystems;
- ▶ local communities and loss of amenity;
- ▶ archaeological or historic features; and
- ▶ the impact of changes in transport arrangements.

A new industrial development will have an impact on the environment and a pre-development environmental assessment should be made. The environmental criteria that could be in the assessment of a suitable site for a new chemical manufacturing company include:

- ▶ issues raised by statutory consultees;
- ▶ the findings of baseline surveys;
- ▶ characterisation of the development during construction, operation and decommissioning;
- ▶ the size of the plant and the proposed number of employees;
- ▶ the location of processes and possible alternatives;
- ▶ the materials to be used and the arrangements for their storage;
- ▶ the proximity of the proposed site to sensitive habitats or species, such as nature reserves, areas of outstanding natural beauty and sites of special scientific interest (SSSI);
- ▶ the presence of protected or vulnerable species on or near the potential site;
- ▶ the existing topography and hydrogeology of the site;
- ▶ the proximity to the main sources of raw materials and principal markets;
- ▶ the environmental consequences of the use of transport;
- ▶ the availability of appropriate waste disposal, recovery and treatment facilities;
- ▶ the capacity of sewerage systems to cope with any new discharges;
- ▶ water quality in nearby rivers, canals and groundwater;
- ▶ archaeology and visual aspects, emergency procedures and security;
- ▶ the sensitivity of neighbouring land uses, such as schools, housing and other commercial and industrial activity;
- ▶ any relevant statutory plans and designations, such as air quality management plans and planning designation of potential sites allowing industrial development; and
- ▶ energy emissions (e.g. noise, vibration, heat, light and radiation).

16.3 International issues

The authors of this book have recently published 'International Health and Safety at Work' which covers the syllabus for the NEBOSH International General Certificate and gives a detailed account of the operation of occupational health and safety internationally. A basic introduction is given here to three aspects of the international scene – the

International Labour Organisation (ILO), the differences between fault and no fault compensation schemes that exist in various parts of the world and working abroad. Many countries have either fault or no-fault compensation schemes for workers involved in accidents. Knowledge of these schemes is important for those who work in several different countries. The hazards of working in unfamiliar countries and/or climates are important health and safety issues and include snake bites, diseases (such as malaria and yellow fever) and sunstroke.

The International Labour Organisation (ILO), World Health Organisation (WHO) and United Nations (UN) have estimated that there are 270 million occupational accidents and 160 million occupational diseases every year throughout the world – and these are recognised as relatively conservative estimates due to probable underreporting. The ILO estimates that 2 million women and men die each year as a result of occupational accidents and work-related diseases. Table 16.1 shows the global numbers in more detail.

In the USA in 2002, approximately 2 million workers were victims of workplace violence. In the UK, 1.7% of working adults (357,000 workers) were the victims of one or more incidents of workplace violence.

Ten per cent of all skin cancers are estimated to be attributable to workplace exposure to hazardous

Table 16.1 Numbers of global work-related adverse events

Event	Average (daily)	Annually
Work-related death	5,000	2,000,000
Work-related deaths to children	60	22,000
Work-related accidents	740,000	270,000,000
Work-related disease	438,000	160,000,000
Hazardous substance deaths	1,205	440,000
Asbestos-related deaths	274	100,000

substances. In Latin America 37% of miners have silicosis, rising to 50% among miners over 50. In India 54.6% of slate pencil workers and 36.2% of stone cutters have silicosis.

In the course of the 20th century, industrialised countries saw a clear decrease in serious injuries, not least because of real advances in making the workplace healthier and safer. The challenge is to extend the benefits of this experience to the whole working world. However, 1984 saw the worst chemical disaster ever when 2,500 people were killed and over 200,000 injured in the space of a few hours at Bhopal. Not only were the workers affected but their families, their neighbours and whole communities. Twenty years later, many



Figure 16.5 (a) Dangerous means of access with platform used to bucket of excavator. A kiss exclusively accepted in some Mexico, for good quality scaffold with protection and water, Belgium

people are still affected by the disaster and are dying as a result. The rusting remains of a once magnificent plant remain as a reminder of the disaster.

According to the ILO, deaths due to work-related accidents and illnesses represent 3.9% of all deaths and 15% of the world's population suffers a minor or major occupational accident or work-related disease in any one year. A large number of the unemployed – up to 30% – report that they suffer from an injury or disease dating from the time at which they were employed. The number of fatal occupational accidents, especially in Asia and Latin America, is increasing.

The main preventable factors for accidents are:

- ▶ Lack of a preventative safety and health culture;
- ▶ Poor management systems;
- ▶ Poor supervision and enforcement by the government.

Experience has shown that a strong safety culture is beneficial for workers, employers and governments alike. Various prevention techniques have proved themselves effective, both in avoiding workplace accidents and illnesses and improving business performance. Today's high standards in some countries are a direct result of long-term policies encouraging a tripartite social dialogue, collective bargaining between trade unions and employers, and effective health and safety legislation backed by potent labour inspection. The ILO believes that safety management systems like ILO-OSH 2001 provide a powerful tool for developing a sustainable safety and health culture at the enterprise level and mechanisms for the continual improvement of the working environment.

16.3.1 The role and function of the ILO

The ILO is a specialised agency of the United Nations that seeks to promote social justice through establishing and safeguarding internationally recognised human and labour rights. It was founded in 1919 by the Treaty of Versailles at the end of the First World War.

The motivation behind the creation of such an organisation was primarily humanitarian. Working conditions at the time were becoming unacceptable to a civilised society. Long hours, unsafe, unhygienic and dangerous conditions were common in low-paid manufacturing careers. Indeed, in the wake of the Russian Revolution, there was concern that such working conditions could lead to social unrest and even other revolutions. The ILO was created as a tripartite organisation with governments, employers and workers represented on its governing body.

The ILO formulates international labour standards and attempts to establish minimum rights including freedom of association, the right to organise, collective bargaining, abolition of forced labour, equality of opportunity and treatment and other standards that regulate conditions across all work-related activities.

Representatives of all ILO member states meet annually in Geneva for the International Labour Conference, which acts as a forum where social and labour questions of importance to the entire world are discussed. At this conference, labour standards are adopted and decisions made on policy and future programmes of work.

The ILO has 178 member states but if a country is not a member, the ILO still has influence as a source of guidance when social problems occur.

The main principles on which the ILO is based are:

1. labour is not a commodity;
2. freedom of expression and of association are essential to sustained progress;
3. poverty anywhere constitutes a danger to prosperity everywhere;
4. the "war against want" requires to be carried on with unrelenting vigour within each nation, and by continuous and concerted international effort in which the representatives of workers and employers, enjoying equal status with those of governments, join with them in free discussion and democratic decision with a view to the promotion of the common welfare.

A campaign launched by the ILO has been to seek to eliminate child labour throughout the world. In particular, the ILO is concerned about children who work in hazardous working conditions, bonded child labourers and extremely young working children. It is trying to create a worldwide movement to combat the problem by:

- ▶ implementing measures which will prevent child labour;
- ▶ withdrawing children from dangerous working conditions;
- ▶ providing alternatives;
- ▶ improving working conditions as a transitional measure towards the elimination of child labour.

ILO Conventions and Recommendations

The international labour standards were developed for four reasons. The main motivation was to improve working conditions with respect to health and safety and career advancement. The second motivation was to reduce the potential for social unrest as industrialisation progressed. Third, the member states want common standards so that no single country has a competitive advantage over another due to poor working conditions. Finally, the union of these countries creates the possibility of a lasting peace based on social justice.

International labour standards are adopted by the International Labour Conference. They take the form of Conventions and Recommendations. At the present time, there are 187 Conventions and 198 Recommendations, some of which date back to 1919.

International labour standards contain flexible measures to take into account the different conditions and levels of development among member states. However, a government that ratifies a Convention must comply with its articles. Standards reflect the different cultural and historical backgrounds of the member states as well as their diverse legal systems and levels of economic development.

Occupational safety and health standards can be divided into four groups, and an example is given in each case:

1. Guiding policies for action

The Occupational Safety and Health Convention, 1985 (No. 155) and its accompanying Recommendation (No. 164) emphasise the need for preventative measures and a coherent national policy on occupational safety and health. They also stress employers' responsibilities and the rights and duties of workers.

2. Protection in given branches of economic activity

The Safety and Health in Construction Convention, 1988 (No. 167) and its accompanying Recommendation (No. 175) stipulate the basic principles and measures to promote safety and health of workers in construction.

3. Protection against specific risks

The Asbestos Convention, 1986 (No. 162) and its accompanying Recommendation (No. 172) gives managerial, technical and medical measures to protect workers against asbestos dust.

4. Measures of protection

Migrant Workers (Supplementary Provisions) Convention, 1975 (No. 143) aims to protect the safety and health of migrant workers.

ILO Conventions are international treaties signed by ILO member states and each country has an obligation to comply with the standards that the Convention establishes.

In contrast, **ILO Recommendations** are non-binding instruments that often deal with the same topics as Conventions. Recommendations are adopted when the subject, or an aspect of it, is not considered suitable or appropriate at that time for a Convention. Recommendations guide the national policy of member states so that a common international practice may develop and be followed by the adoption of a Convention.

ILO standards are the same for every member state and the ILO has consistently opposed the concept of different standards for different regions of the world or groups of countries.

The standards are modified and modernised as needed. The governing body of the ILO periodically reviews individual standards to ensure their continuing relevance.

Supervision of international labour standards is conducted by requiring the countries that have ratified Conventions to periodically present a report with details of the measures that they have taken, in law and practice, to apply each ratified Convention. In parallel, employers' and workers' organisations can initiate contentious proceedings against a member state for its alleged non-compliance with a Convention it has ratified. In addition, any member country can lodge a complaint against another member state which, in its opinion, has not ensured in a satisfactory manner the implementation of a Convention which both of them have ratified. Moreover, a special procedure exists in the field of freedom of association to deal with complaints submitted by governments or by employers' or workers' organisations against a member state whether or not the country concerned has ratified the relevant Conventions. Finally, the ILO has systems in place to examine the enforcement of international labour standards in specific situations.



Figure 16.6 World Cup stadium, under construction, Cape Town, 2009

The ILO also publishes Codes of Practice, guidance and manuals on health and safety matters. These are often used as reference material by either those responsible for drafting detailed Regulations or those who have responsibility for health and safety within an organisation. They are more detailed than either Conventions or Recommendations and suggest practical solutions for the application of ILO standards. Codes of Practice indicate 'what should be done'. They are developed by tripartite meetings of experts and the final publication is approved by the ILO governing body.

For example, the construction industry has a Safety and Health in Construction Convention, 1988 (No. 167) that obliges signatory ILO member states to comply with the construction standards laid out in the Convention – the Convention is a relatively brief statement of those standards. The accompanying Recommendation (No. 175) gives additional information on the Convention statements. The Code of Practice gives more detailed

information than the Recommendation. This can best be illustrated by contrasting the coverage of scaffolds and ladders by the three documents shown in Appendix 16.1.

Important ILO Conventions (C) and Recommendations (R) in the field of occupational safety and health include:

- ▶ C 115 Radiation Protection and (R 114), 1960;
- ▶ C 120 Hygiene (Commerce and Offices) and (R 120), 1964;
- ▶ C 139 Occupational Cancer and (R 147), 1974;
- ▶ C 148 Working Environment (Air, Pollution, Noise and Vibration) and (R 156), 1977;
- ▶ C 155 Occupational Safety and Health and (R 164), 1981;
- ▶ C 161 Occupational Health Services and (R 171), 1985;
- ▶ C 162 Asbestos and (R 172), 1986;
- ▶ C 167 Safety and Health in Construction and (R 175), 1988;
- ▶ C 170 Chemicals and (R 177), 1990;
- ▶ C 174 Prevention of Major Industrial Accidents and (R 181), 1993;
- ▶ C 176 Safety and Health in Mines and (R 176), 1995;
- ▶ C 184 Safety and Health in Agriculture and (R 192), 2001;
- ▶ C 187 Promotional Framework for Occupational Safety and Health and (R 197), 2006;
- ▶ R 97 Protection of Workers' Health Recommendation, 1953;

- ▶ R 102 Welfare Facilities Recommendation, 1956;
- ▶ R 31 List of Occupational Diseases Recommendation, 2002.

Copies of Conventions, Recommendations and Codes of Practice can be obtained from the ILO website www.ilo.org/safework.

16.3.2 Compensation and insurance issues

Accidents/incidents arising out of the organisation's activities resulting in injuries to people and incidents resulting in damage to property can lead to compensation claims. There are two facets to this – employers' liability insurance, and fault and no-fault compensation.

Employers' liability insurance

In many countries, employers are required to take out employers' liability insurance to cover their liability in the event of accidents and work-related ill-health to employers and others who may be affected by their operations. This ensures that any employee, who successfully sues his/her employer following an accident, is assured of receiving compensation irrespective of the financial position of the employer.

Fault and no-fault injury compensation

In the UK, compensation for an injury following an accident is achieved by means of a successful legal action in a civil court (as discussed in Chapter 1). In such cases, injured employees sue their employer for negligence and the employer is found liable or at fault. This approach to compensation is adversarial, costly and can deter injured individuals of limited means from pursuing their claim. In a recent medical negligence claim in Ireland, costs were awarded against a couple who were acting on behalf of their disabled son, and they were faced with a bill for €3 million.

The spiralling cost of insurance premiums to cover the increasing level and number of compensation awards, despite the Woolfe reforms (see Chapter 5), has led to another debate on the introduction of a no-fault compensation system. It has been estimated that in medical negligence cases, it takes on average six years to settle a claim and only 10% of claimants ever see any compensation.

No-fault compensation systems are available in many parts of the world, in particular New Zealand and several states in the USA. In these systems, amounts of compensation are agreed centrally at a national or state level according to the type and severity of the injury. The compensation is often in the form of a structured continuous award rather than a lump sum and may be awarded in the form of a service, such as nursing care, rather than cash.



Figure 16.7 Good quality events on a lift with the covering to be used in Belgium.

The no-fault concept was first examined in the 1930s in the USA to achieve the award of compensation quickly in motor car accident claims without the need for litigation. It was introduced first in the State of Massachusetts in 1971 and is now mandatory in nine other states although several other states have either repealed or modified no-fault schemes.

In 1976, the Pearson Commission in the UK rejected a no-fault system for dealing with clinical negligence even though it acknowledged that the existing tort system was costly, cumbersome and prone to delay. The principal reasons for rejection were given as the difficulties in reviewing the existing tort liability system and in determining the causes of injuries.

In New Zealand, there was a general dissatisfaction with the workers' compensation scheme, which was similar to the adversarial fault-based system used in Australia and the UK. In 1974, a no-fault accident compensation system was introduced and administered by the Accident Compensation Corporation (ACC). This followed the publication of the Woodhouse Report in 1966 which advocated 24-hour accident cover for everybody in New Zealand.

The Woodhouse Report suggested the following five principles for any national compensation system:

- ▶ community responsibility;
- ▶ comprehensive entitlement irrespective of income or job status;
- ▶ complete rehabilitation for the injured party;
- ▶ real compensation for the injured party;
- ▶ administrative efficiency of the compensation scheme.

The proposed scheme was to be financed by channelling all accident insurance premiums to one national organisation (the ACC).

The advantages of a no-fault compensation scheme include:

1. Accident claims are settled much quicker than in fault schemes.
2. Accident reporting rates will improve.
3. Accidents become much easier to investigate because blame is no longer an issue.
4. Normal disciplinary procedures within an organisation or through a professional body are unaffected and can be used if the accident resulted from negligence on the part of an individual.
5. More funds are available from insurance premiums for the injured party and less used in the judicial and administrative process.

The possible disadvantages of a no-fault compensation system are:

1. There is often an increase in the number of claims, some of which may not be justified.
2. There is a lack of direct accountability of managers and employers for accidents.



Figure 16.8 Different solutions are needed in different countries: delivering furniture in Cortina, Italy

3. Mental injury and trauma are often excluded from no-fault schemes because of the difficulty in measuring these conditions.
4. There is more difficulty in defining the causes of many injuries and industrial diseases than in a fault scheme.
5. The monetary value of compensation awards tend to be considerably lower than those in fault schemes (although this can be seen as an advantage).

No-fault compensation schemes exist in many countries including Canada and the Scandinavian countries. However, a recent attempt to introduce such a scheme in New South Wales, Australia, was defeated in the legislative assembly.

16.3.3 Working abroad

Introduction

Staff may travel and work abroad in the course of the organisation's business. Most of this work is no more risky than the equivalent activity in their home country and takes place in countries that are considered safe for travellers. Increasingly though, work takes place in countries or parts of countries where the relevant government office advises against travel.

This section outlines the steps needed for safe management of these activities. It applies to work carried out by staff (working alone or with colleagues).

General safety advice

Safety begins when you pack. To help avoid becoming a target, do not dress so as to mark yourself as an affluent tourist. Expensive-looking jewellery, for instance, can draw the wrong attention.

- ▶ Always try to travel light. You can move more quickly and will be more likely to have a free hand. You will also be less tired and less likely to set your luggage down, leaving it unattended.
- ▶ Carry the minimum number of valuables, and plan places to conceal them. Your passport, cash and credit cards are most secure when locked in a hotel safe. When you have to carry them on your person, you may wish to put them in various places rather than all in one wallet or pouch. Avoid handbags, fanny packs and outside pockets that are easy targets for thieves. Inside pockets and a sturdy shoulder bag with the strap worn across your chest are somewhat safer. One of the safest places to carry valuables is in a pouch or money belt worn under your clothing.
- ▶ If you wear glasses, pack an extra pair. Bring them and any medicines you need in your carry-on luggage.

To avoid problems when passing through customs, keep medicines in their original, labelled containers. Bring copies of your prescriptions and the generic names for the drugs. If a medication is unusual or contains narcotics, carry a letter from your doctor attesting to your need to take the drug. If you have any doubt about the legality of carrying a certain drug into a country, consult the embassy or consulate of that country before you travel.

- ▶ Bring traveller's cheques and one or two major credit cards instead of cash.
- ▶ Pack an extra set of passport photos along with a photocopy of your passport's information page to make replacement of your passport easier in the event it is lost or stolen.
- ▶ Put your name, and organisation's address and telephone numbers inside and outside of each piece of luggage. Use covered luggage tags to avoid casual observation of your identity or nationality. If possible, lock your luggage.

Risks involved in overseas work

Risks to health and safety that arise from overseas work can be:

1. work-related (e.g. physical risks from the fieldwork itself);

2. health-related (e.g. exposure to tropical diseases);
3. related to personal security (e.g. associated with local criminal or political activity, or civil unrest).

The following concentrate on the third point above as the health and safety aspects of the work itself are covered throughout this book.

Risk assessment

Risk assessments must be made for all work abroad. This need not necessarily be onerous – the nature and complexity of the assessment should reflect the risks involved in the work. In many cases the work itself is not hazardous but it takes place in hazardous surroundings. In these cases the risk assessment should concentrate on the travel-associated risks. For instance, no written risk assessment would be needed for low risk activities such as attending conferences or visiting colleagues in Australia or the European Union, but similar activities in more dangerous locations would require one.

Travel advice

Many national foreign office departments or consulates will have information about safe travel. The UK's Foreign and Commonwealth Office (FCO) has a website (www.fco.gov.uk/travel) which carries up-to-date travel advice for over 200 countries. It could be used as the basis for informing all those travelling on business or leisure of the risks that they might face. Although the advice pertains to the safety of British travellers, it is relevant to other nationalities as British insurance companies use it to determine the extent or validity of insurance cover.



Figure 16.9 Living outside the UK

Health matters

Staff travelling on business should take advice on the potential health risk associated with travel. This should be sought in good time so that any recommended immunisations can be given and/or prophylactic drugs prescribed.

Index 16.2 has some useful safe travel recommendations.

16.3.4 ILO recommendations for road transport drivers

The ILO covers some aspects of driver health and safety in the Hours of Work and Rest Periods (Road Transport) Convention 1979 (No. 153) and its accompanying Hours of Work and Rest Periods (Road Transport) Recommendation 1979 (No. 153).

The Convention states that no driver shall be allowed to drive continuously for more than four hours without a break, although this may be exceeded by no more than one hour under certain circumstances. The maximum total driving time, including overtime, must not exceed nine hours per day or 48 hours per week. The length of the break and, as appropriate, the way in which the break may be split shall be determined by the competent authority or body in each country.

The Convention also states that the daily rest of drivers shall be at least ten consecutive hours during any 24-hour period starting from the beginning of the working day. The daily rest may be calculated as an average over periods to be determined by the competent authority or body in each country. During the daily rest the driver shall not be required to remain in or near the vehicle if he has taken the necessary precautions to ensure the safety of the vehicle and its contents.

The Recommendation adds the following detail:

- ▶ The normal hours of work should not exceed eight per day as an average.
- ▶ The length of the break after the four-hour driving period and, as appropriate, the way in which the break may be split should be determined by the competent authority or body in each country.
- ▶ The maximum total driving time, including overtime, should exceed neither nine hours per day nor 48 hours per week (averaged, if necessary, over a maximum period of four weeks).
- ▶ The daily rest of drivers should be at least 11 consecutive hours during any 24-hour period starting from the beginning of the working day.
- ▶ The daily rest may be calculated as an average over periods to be determined by the competent authority or body in each country; provided that the daily rest should in no case be less than eight hours in respect of the recommended duration of the daily rest periods and the manner of taking such rest periods may be provided in the cases of vehicles having a crew of two drivers and of vehicles using a ferry-boat or a train).
- ▶ The minimum duration of the weekly rest should be 24 consecutive hours, preceded or followed by the daily rest.

- ▶ In long-distance transport, it should be possible to accumulate weekly rest over two consecutive weeks. In appropriate cases, the competent authority or body in each country may approve the accumulation of this rest over a longer time.

16.4 Health and safety in the home

Why does a book on health and safety at work include a section on home safety? Recent quotes from practitioners in emergency medicine, based on previously unpublished NHS research, show that more accidents occur in the home than anywhere else.

Dr Cliff Mann, president of the College of Emergency Medicine, is quoted in *The Guardian* (12 December 2014), saying that leisure pursuits such as trampolining, horse riding, mountain biking and DIY are more dangerous than previously thought. Because workplace and road safety have improved, home and leisure pursuits now cause more injury and death, averaging 1,000 cases a month. These accidents cost A&E units approximately £1 billion a year.

'The reality is that you are more likely to die sorting out the Christmas lights by taking them out of the loft or trying to fix the faulty plug or flex, than an electrician is on a building site. You are [safer] being at work or driving to and from work than you are being at home or doing a leisure activity with you family and friends. ... People think the kitchen is the most dangerous room in the house but it's actually the living room. Children get scalded from their parents having a hot cup of tea, people get burnt by the fire and elderly people can trip on rugs. ... With DIY the use of drills and chainsaws can lead to very severe injuries. You can half-amputate a limb with a chainsaw. Falling off a ladder ... some people die and some never work again. Falls from lofts, typically a drop of 10 ft, can result in broken limbs and bleeding in the brain, and such falls are more common than is generally realised.'

Recent figures from A&E at the John Radcliffe Hospital in Oxford and the Horton General Hospital in Banbury show that over an 18-month period 26,310 patients were treated for injuries: 41% of these were people hurt at home, 25% were hurt during leisure activities, 15% were road accidents, 10% were education related such as PE lessons and only 8% were at work.

Here are some facts and figures taken from RoSPA's research. Unfortunately there are no government statistics after 2002 because the former Department of Trade and Industry (DTI) ceased to collect injury data for its Home Accident Surveillance System (HASS) and Leisure Accident Surveillance System (LASS). (See www.rospace.com)

Home safety facts and figures

- ▶ More accidents happen at home than anywhere else.
- ▶ Every year there are approximately 4,000 deaths as the result of a home accident. Around 120 of these are individuals aged below 15 years and 1,300 over 75.
- ▶ During 2002 there were 2.7 million home accidents requiring hospital treatment, of which 477,500 involved children under 5.
- ▶ Children under the age of 5 and people over 65 (particularly those over 75) are most likely to have an accident at home.
- ▶ Falls are the most common accidents, which can cause serious injury at any time of life. Fifty-five per cent of accidental injuries in the home involve falls.
- ▶ More women than men over the age of 65 die as the result of an accident in the home.
- ▶ Approximately 1,500 people aged over 75 die annually as the result of a fall.
- ▶ Every year around 120 children under 14 die as the result of an accident in the home.
- ▶ Around 25,000 under-fives attend A&E departments each year after being accidentally poisoned.
- ▶ 26,000 under-fives are burnt or scalded in the home every year. A hot drink can still scald a small child up to 15 minutes after it is made.
- ▶ More accidents happen in the lounge/living room than anywhere else in the home.
- ▶ Every year more than 4,200 children are involved in falls on the stairs and 4,000 children under the age of 15 are injured falling from windows.
- ▶ Boys have more accidents than girls.
- ▶ The cost to society of UK home accident injuries has been estimated at £45.63 billion (£45,630 million) annually.



Figure 16.10 Gas explosion during the night last year – and the fire alarm was disabled beforehand – houses destroyed Southampton, 2014

Even if you buy a ticket every week in a year you are 20 times more likely to suffer a fatal home accident that you are to win the National Lottery!

Prevention – a few hints

Fire safety

- ▶ Keep fires and heaters well guarded. Nursery guards with side clips are essential if there are young children around.
- ▶ Portable heaters and candles should be positioned so that they cannot be knocked over and away from furniture and curtains.
- ▶ Clothes should not be dried and aired over or near a fire or cooker.
- ▶ Never smoke in bed.
- ▶ Never leave a deep fat fryer or pan of fat unattended on a lit stove.
- ▶ Keep matches and lighters out of the reach of children.
- ▶ Fit approved smoke detectors on each floor, either mains operated or with longlife batteries.
- ▶ Plan your escape route.

Electrical safety

- ▶ If you buy an older property, get the wiring checked straight away.
- ▶ Worn and damaged flexes should not be used and flexes should not be wired together.
- ▶ Portable mains operated devices should not be used in the bathroom.
- ▶ Have electric blankets serviced and checked regularly.
- ▶ If an appliance seems to be faulty stop using it.
- ▶ Residual current devices (RCDs) protect the whole house and make the use of power tools safer.
- ▶ Buy electrical equipment with a CE mark, BEAB mark, BS mark or British Standard number.
- ▶ Never overload an electrical socket.

Heating and cooking

- ▶ Never block or lean anything against air vents or air bricks as they help waste gases to escape. The same applies to outside grilles.
- ▶ Be aware that carbon monoxide poisoning causes drowsiness and flu-like symptoms.
- ▶ Chimneys in use should be swept annually, more often if burning wood.
- ▶ Check the pilot light on a water heater and gas cooker to make sure it is lit.
- ▶ Beware of second-hand appliances and cowboy installers when buying gas appliances. Look for the safety mark or seal of approval and only use GAS Safe approved installers.
- ▶ Young children and elderly people are especially at risk from fires and heaters.
- ▶ If a gas leak is suspected turn off the supply, open the windows, call the gas supplier and avoid operating any switches as they can spark.

- ▶ Alcohol and fuel gel burners should be used with great care as the flame from them is virtually invisible and the fuel is highly flammable.
- ▶ Kitchen planning is important – heavy items should not be kept on high shelves. Things in daily use should be easy to reach.
- ▶ Knives need to be kept sharp and out of the reach of children.
- ▶ Fry handles need to be turned inwards on the stove.
- ▶ Hot liquids need special care if there are children or vulnerable adults around.
- ▶ Cordless kettle is the safest option.

Safety Glass

- ▶ Ordinary glass at low level is dangerous but less so if the area is well lit and people are made aware that it is there. Children should never be allowed to play near it.
- ▶ Safety glass is much better, either laminated or toughened. In new buildings it is a requirement in areas below 800mm.

Medicines and cleaners

- ▶ Have a lockable medicine cabinet and keep medicines clearly labelled.
- ▶ Make sure that chemicals are not kept where children can see or reach them.
- ▶ Return old medicines to the pharmacy.

DIY and garden safety

- ▶ Gas and electrical work should always be done by a competent qualified person.
- ▶ Keep tools clean and in good repair.
- ▶ Plan ahead and allow plenty of time. Being unprepared and in a hurry is more likely to result in an accident.
- ▶ Tools, paint, chemicals, anything sharp, should be kept out of sight and reach of children.
- ▶ Be extra careful with adhesives, especially instant ones.
- ▶ Disconnect the electricity before working on electrical appliances and tools.
- ▶ Wear strong shoes and appropriate clothing when mowing, strimming, brushcutting. Keep hands and feet away from blades and twine. Children and pets are at risk here too.
- ▶ Keep products in original containers.
- ▶ Barbecues should be well away from trees, fences and buildings. Never pour petrol on a barbecue or bonfire that is alight.
- ▶ A residual current device (RCD) is essential for outdoor electrical equipment unless the property is already wired for this.

Accidents to older people

Higher living standards, better health care and awareness of the need to pay attention to diet and

exercise have led to people living and working longer, so we need to think about health and safety in respect of older people. People over 65 years of age are most at risk of an accident in and around the home. Most of these accidents happen on the stairs or in the kitchen. Falls from stairs or steps are the most common, but people also fall from a bed or chair, or trip over a rug or mat. As people age they become less stable for a variety of reasons. Awareness of this fact means that areas of risk can be identified to make the older person's environment safer.

Main areas of risk that should be targeted are:

- ▶ Trips and fall from poor eyesight, frailty and balance, negotiating stairs, no or insecure handrails, poor flooring and unsuitable shoes;
- ▶ Fire-related accidents from cookers, flammable materials, candles, coal fires, heaters and electric blankets;
- ▶ Poisoning accidents from medicines, carbon monoxide and piped gas;
- ▶ Burns from radiators, electric fires and cookers, scalds from kettles, hot water bottles and uncontrolled hot water;
- ▶ Hypothermia from poor heating, sedentary living, inadequate nutrition and clothes.

Finally a word from Prof. Keith Willett, NHS England director for acute care:

'The number of people who come through Accident and Emergency with DIY, leisure and gardening injuries is striking. Working as a trauma surgeon for over 30 years, it has been frustrating to see how many people come to A&E with injuries that could have been avoided with a bit more care. However I would much rather people remained active and fit for their general mental and physical well-being than that they avoid sport.'

16.5 Safe cycling

Cycling has gained in popularity over recent years and various initiatives have encouraged people to cycle to work, school and college as well as taking up cycling as a hobby and to improve their fitness. So of course there are many more bikes out there on the road and although local and national authorities are improving cycling conditions by making new cycle routes, there are still a lot of accidents. In fact according to Sustrans (the sustainable transport charity and organisers of the National Cycle Network) in Britain around 19,000 cyclists are killed or injured every year in reported road accidents.

But there are many ways to cycle safely. Here are some guidelines:

Road cycling

- ▶ follow the Highway Code; cyclists are road users so red traffic lights apply to them and, unless designated, pavements are not for cycling;

- ▶ adjust your speed – wet and icy surfaces alter the way that tyres and brakes behave;
- ▶ claim your space on the road and be decisive. Give parked cars a wide berth in case someone opens a door.;
- ▶ wear a helmet;
- ▶ keep your bike in good condition.



Figure 16.11 Tour de France for professional cyclists, French Alps, 2014

Be visible

- ▶ ride where you can be seen especially when passing trucks and buses;
 - ▶ use lights in poor visibility and at night and wear bright and reflective clothing;
 - ▶ make eye contact with other road users to be sure that they have seen you;
 - ▶ signal clearly;
 - ▶ use your bell;
- be aware that some new LED lights are so bright that they can dazzle oncoming cyclists. There is usually a lower intensity setting to use in town.

Awareness of other vehicles

Many collisions occur when a cyclist is on the inside of a vehicle that is going left. Avoid 'undertaking' large vehicles and never cycle along the inside of trucks and buses. When a large vehicle turns left, it often swings out to the right first to get round the corner and this creates a large empty space. Cyclists are tempted to ride into this space, but the gap will disappear as the vehicle swings round to the left. A lot of accidents have happened this way.

Cycle training

People who are new to cycling or have not cycled for some time will find that cycle training helps to build



Figure 16.12 Tour de France for women, France, 2014

confidence and develop skills. The CTC (cycle touring club) can give advice about courses and trainers (www.ctc.org.uk).

Motorists, be aware!

- ▶ when turning left watch for cyclists coming up the nearside;
- ▶ give cyclists a wide berth when overtaking;
- ▶ dip your headlights at night when approaching cyclists;
- ▶ in wet or icy weather be extra vigilant when passing cyclists.

Cyclists and motorists have equal rights to the same road space. On shared pavements the same applies to cyclists and pedestrians. Respect for each other will benefit all of us.

16.6 Further information

The Health and Safety at Work etc. Act 1974

The Management of Health and Safety at Work Regulations 1999 (as amended)

The Environmental Protection Act 1990

The Hazardous Waste (England and Wales) Regulations 2005

ILOLEX (ILO database of International Law) <http://www.ilo.org/ilolex/index.htm>

Occupational Health and Safety Assessment Series (OHSAS 18000)

Occupational Safety and Health Convention (C155), ILO <http://www.ilo.org/ilolex/cgi-bin/cnvde.pl?C155>

Occupational Safety and Health Recommendation (R164), ILO <http://www.ilo.org/ilolex/cgi-bin/cnvde.pl?R164>

Safety in the Global Village, IOSH Information

Sheet, 1999 Safety in the Global Village, IOSH

Information Sheet, 1999 <http://www.iosh.co.uk/index.cfm?go=technical.guidance>

APPENDIX 16.1: Scaffolds and ladders

1. Convention (Safety and Health in Construction) (167)

Article 14

- Where work cannot safely be done on or from the ground or from part of a building or other permanent structure, a safe and suitable scaffold shall be provided and maintained, or other equally safe and suitable provision shall be made.
- In the absence of alternative safe means of access to elevated working places, suitable and sound ladders shall be provided. They shall be properly secured against inadvertent movement.
- All scaffolds and ladders shall be constructed and used in accordance with national laws and Regulations.
- Scaffolds shall be inspected by a competent person in such cases and at such times as shall be prescribed by national laws or Regulations.

1.2. Recommendation (Safety and Health in Construction) (175)

Scaffolds

- Every scaffold and part thereof should be of suitable and sound material and of adequate size and strength for the purpose for which it is used and be maintained in a proper condition.
- Every scaffold should be properly designed, erected and maintained so as to prevent collapse or accidental displacement when properly used.

- The working platforms, gangways and stairways of scaffolds should be of such dimensions and so constructed and guarded as to protect persons against falling or being endangered by falling objects.
- No scaffold should be overloaded or otherwise misused.
- A scaffold should not be erected, substantially altered or dismantled except by or under the supervision of a competent person.
- Scaffolds as prescribed by national laws or Regulations should be inspected, and the results recorded, by a competent person:
 - before being taken into use
 - at periodic intervals thereafter
 - after any alteration, interruption in use, exposure to weather or seismic condition or any other occurrence likely to have affected their strength or stability.

1.3. Code of Practice – Safety and Health in Construction

The Code of Practice covers scaffolds and ladders under the following topics over five pages:

- general provisions
- materials
- design and construction
- inspection and maintenance
- lifting appliances on scaffolds
- prefabricated scaffolds
- use of scaffolds.

APPENDIX 16.2: International travel tips

1. General international travel tips

- Leave copies of your passport, visa and itinerary with your office and home. If you should lose any documents you would have easy access to a copy.
- Ask the relevant authorities/travel experts for a country profile if you are travelling to a new destination. They can provide extensive data on weather, local customs, food, political climate and much more.
- Your luggage may be searched upon entering a country, so pack accordingly. Know what items are taboo in the country you are visiting.
- Be wary of anyone loitering around doors to your room, and notify the desk of your suspicions.
- Do not swap or sell any personal effects, such as jewellery or religious items, in countries where it is illegal to do so.
- Avoid photographing military installations, border protection points and sensitive government buildings.
- Avoid any area of the city which has been the target of a terrorist attack or is a place where they are known to congregate.
- Know the location of the embassy of your passport country, and have that phone number with you at all times.
- If you go out, let another member of your group know when you expect to return and the general location you are visiting. You may wish to provide a contact number as well.
- If you are in a situation where someone starts shooting a gun, drop to the floor or get down as low as possible and don't move until you are sure the danger has passed. If possible, shield yourself behind or under a solid object.

2. Hotel travel tips

- ▶ Reserve rooms above first floor.
- ▶ Keep doors and windows locked, and check them before retiring.
- ▶ Put valuables in the hotel room safe.
- ▶ Keep curtains/blinds closed after dark.
- ▶ Verify workmen with the front desk before admitting them into your room.
- ▶ Locate your nearest emergency exit and fire extinguisher.
- ▶ Be careful answering the door. Use the peephole, or leave the chain attached when opening the door to talk.
- ▶ Don't accept packages or items unless you know the source.
- ▶ Don't answer the phone with your name.
- ▶ Remember that the doorknob signs tell an outsider whether you are in the room (Do Not Disturb) or out of the room (Please Make Up This Room).
- ▶ Take your passport and other forms of identification with you when leaving the room.
- ▶ Do not indiscriminately give out names and room numbers of others in your group.
- ▶ Know your hotel phone number.

3. Taxi travel tips

- ▶ If possible, pick your own taxi.
- ▶ Have the address of your destination and hotel written in the local language.
- ▶ If you call a taxi, wait for it indoors.
- ▶ Compare the face of the taxi driver with the posted licence.
- ▶ When in a metered taxi, make sure the meter is activated.
- ▶ When boarding a bus or limo, do so promptly.
- ▶ Keep an eye on the loading and unloading of your baggage, especially if you are sharing a taxi or limo which makes an intermediate stop.

4. Lost luggage travel tips

- ▶ If your luggage is lost, find an airline representative and report the problem.
- ▶ You will be given a form to complete. DO THIS IMMEDIATELY, BEFORE YOU LEAVE THE AIRPORT. This form will describe the luggage and its contents.
- ▶ Obtain a copy of the form before giving it to an airline representative.
- ▶ If you are asked to surrender your claim checks, make sure you note this on the form.
- ▶ 98% of lost luggage is found within several hours, and will be put on the next flight to your destination.
- ▶ If you cannot wait, make sure the airline has your address to forward your luggage.
- ▶ If you need to buy or rent replacement items, most carriers will front you some cash.
- ▶ If luggage is never found, you will be asked to estimate the value (depreciated) of its contents. If you claim anything new or costly (i.e. camera), you may be asked to provide receipts and other documentation.

5. Walking travel tips from the travel experts at Safe Harbours

- ▶ Avoid walking alone or travelling to remote places after dark, avoid poorly lit streets and narrow alleys.
- ▶ Do not wear flashy jewellery.
- ▶ Avoid public demonstrations, accidents or civil disturbances.
- ▶ Do not engage in loud conversations or arguments.
- ▶ Avoid discussing personal matters with people you do not know.
- ▶ Keep a phrase book handy.
- ▶ Know how to use the pay phones in the country you are visiting, and carry exact change in local currency.
- ▶ Avoid bringing any unnecessary attention to yourself.

CHAPTER

17

Study skills

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This chapter covers:

- ▶ How to plan and organise self-study work
- ▶ How to manage study and revision time
- ▶ Understanding and organising revision
- ▶ Understanding the concept of memory techniques
- ▶ Understanding how to tackle examinations in the exam room and afterwards
- ▶ Understanding about examiners' reports and what some of the latest reports are saying
- ▶ Understanding the marks allocated to each NEBOSH question

17.1 Introduction

This chapter speaks directly to you, the student. For the NEBOSH certificate you need study skills and exam techniques and this means careful planning from the beginning of the course.

Think in terms of:

- ▶ clear and realistic goals, both short and long term;
- ▶ techniques for studying and passing exams;
- ▶ a well-organised approach;
- ▶ strong motivation.

People say that genius is 99% application and only 1% inspiration, so good organisation and exam technique are what really matters when it comes to passing exams. Studying is an activity in its own right and there are ways in which you can make your study more effective and give yourself the greatest possible chance of success. The place where you study, the way you plan your study time, how you adapt your study to suit your lifestyle, the way that you take notes, memory and concentration skills, revision techniques, and being clear about the contents of the syllabus and what is expected by the examiner – attention to all these details will give you the best chance of passing the exam.

17.2 Find a place to study

The skill of studying usually has to be learned, so it's worth thinking carefully about the basics. If you can find somewhere quiet and free from distractions, and keep that place just for your studies, it will be easier to get down to work. You need a place with good ventilation to help you to stay alert, and somewhere that has a comfortable temperature. Make sure there is enough light – a reading lamp helps to prevent eyestrain and tiredness.

An upright chair is better than an armchair. Make sure that the workspace is large enough. The size recommended by Warwick University, for example, is a minimum of 80 cm x 1.5 m. If you can, find a place where your study materials do not have to be cleared away – it's easy to put off starting work if they are not instantly accessible.

17.3 Make a study plan

Start by making a study timetable. First of all, put aside some time for study so that it does not get squeezed out of your working week. Your timetable will need to include time for carrying out assignments set by tutors, time for going over lecture notes and materials, any further reading rated as 'essential' and, if possible, reading rated as 'desirable'. You should allocate time for revision as the course progresses because the more regularly you revise, the more firmly the information will become fixed in your memory. This will make it much easier to remember when you take the exams.

After every hour of study, take a short break and, if possible, have a change of atmosphere. Physical exercise will help to increase your concentration. Even a short, brisk walk round the block will improve your attention span.

Vary your activities while you are studying. For example, you could spend some time gathering information from books, the internet and so on, then maybe work on a diagram or a graph, followed by writing, reading and so on.

17.4 Time management

Finding time to study and take exams when your life is already filled with work, family and social commitments is clearly not going to be easy. The Open University (OU) has been working with adult learners since 1969 and they provide a lot of useful, free information about this at: www.open.edu/openlearn/free-course. Here are some ideas from 'manage your time effectively' to help you to plan.

The aim is to develop good work habits and time-management practices. These are often a matter of developing the right attitudes towards your work and towards your time.

Ten tips to help you manage your time:

1. establish goals and targets;
2. work smarter, not harder – value your time;
3. avoid attempting too much;
4. schedule activities, allow time for emergencies, minimise interruption, identify and use your peak energy times, put similar tasks together;

control of paper work and electronic work;
 stop day dreaming;
 try to track time wasting;
 set a time limit on some tasks;
 prioritise, finish things;
 work at a steady pace and review your progress

of your learning so that you can reflect
 on your time – are you managing it
 well? Think about how you deal with the
 unexpected, with emergencies. How do you prioritise
 your work and your time? Can you set deadlines?
 How do you meet them? If not, how do you deal with the
 consequences?

There is a section on time management in the Guide
 to the NEBOSH General Certificate. This subject is also
 covered in 17.13.1 Planning and Revision.

17.6 Blocked thinking

At times your thinking can become blocked. If this
 happens, try leaving the problem area of study alone
 for a few days and tackle a different part of the subject.
 If you concentrate too hard on something that is
 difficult you are likely to lose confidence. Usually,
 after a break, the difficulty vanishes and the problem
 is solved. This could be because the solution has emerged
 from a different perspective, or because you have
 seen something new that has supplied the answer.
 Psychologists think it's possible that some problems
 can be solved during sleep when your mind has a
 chance to wander and think laterally.

17.6 Taking notes

The most efficient way to store notes is in a loose-
 leaf folder, because you can easily add extra
 information. Write only on one side of the sheet and
 use margined paper. The facing pages can be used to
 make summaries or extra points. If notes are clearly
 written and well spaced out, they are much more
 straightforward to work from and more attractive to
 return to later. Use colour, highlighting and underlining
 too; notes that look good are more appealing and easier
 to revise.

During revision it will be important to be able to identify
 subjects quickly, so use headings, numbering, lettering,
 bullet points, indentation and so on. It is worth spending
 a bit of extra time to make revision easier.

Key words and phrases are better than continuous
 prose when you are taking notes. While you are writing
 down information it is easy to miss essential points
 that are being made by the tutor. Try to read through
 your notes within 36 hours to make sure that they are
 completely clear, so that when you revise you will not
 be puzzling over what you have written. At this point

you may be able to add more information, while it is
 fresh in your mind. Reading through notes in this way
 also helps to fix the information in your memory and
 the level of recall will be further improved by reading
 them again a week later. Although it seems time-
 consuming, this technique will save you a lot of time in
 the long run.

Many people find that they can understand and
 remember more effectively by making 'mind maps'
 (also known as 'pattern notes'). These will be discussed
 in more detail in the revision section.

17.7 Reading for study

Most people will be working as well as studying, so you
 will need techniques to help you make the best use of
 your time. For example, you don't need to read a whole
 book for study purposes, apart from books written
 specifically to a syllabus, such as this one. Use the
 index and be selective. In this book an example would
 be Chapter 15 on summaries of legislation.

Where a book is not specifically written to a syllabus,
 time-saving techniques such as skim reading can be
 used. First of all, flip through the book to see what
 it contains, looking at the contents, summaries,
 introduction, tables, diagrams and so on. It should be
 possible to identify areas that are necessary to the
 syllabus. These can be marked with removable adhesive
 strips or 'Post-it' notes.

Second, quickly read through the parts of the book that
 you have identified as useful. Two ways of doing this
 are:

- run a finger slowly down the centre of a page,
 watching it as it moves. You will pick up relevant
 words and phrases as your finger moves down the
 page;
- read in phrases, rather than word by word, which
 will increase your reading speed.

Both these methods need practice but they save a lot
 of time and effort. It is better to read through a piece
 two or three times, quickly, than to read it once slowly
 but if there is a really difficult piece of information that
 is absolutely essential to understand, read it aloud, slowly.
 Finally, at the end of each section or chapter, make
 a few brief notes giving the essential points.

It is worth learning to speed-read if a course involves
 a lot of reading. Tony Buzan's series *The Mind Set*
 explains the technique.

17.8 Free learning resources from the Open University

The OpenLearn section of the Open University is a very
 useful resource which is free and is available worldwide.
 There is an extensive study skills section containing

units which range from 3 to 50 hours of study. Have a look at 'The Learning Space'. Here are a few examples of what is available:

- ▶ **EAL_1. Am I ready to study in English? (5 hours)**
This unit provides a series of exercises to help you to reflect on the use of English at an academic (as opposed to everyday) level. It is designed for people who have been educated in a language other than English, or for those who have studied in a country where the conventions are different from those used in the British educational system.
- ▶ **LDT 101_1. Revision and examinations (6 hours)**
This unit is for people who are unsure about exams. Perhaps you have not taken an exam for a long time, or have had a bad experience with exams in the past; or maybe you have never taken an exam? This unit aims to help you to develop techniques for revision and exam taking and to reassure you.
- ▶ **LDT 101_3. Learning how to learn (6 hours)**
This unit looks at learning as an active process and provides activities that will help you to learn more effectively.

You can access these free resources on www.open.edu/openlearn/free-course

17.9 Organising for revision

As the exam approaches, you will need to organise all the information from the course in preparation for revision. Ideally, of course, you should have been doing this throughout, but it is not too late to start. It will just mean extra work. Information from lectures, reading, practical experience and assignments will have to be organised into a form that makes it easier for you to remember. As well as this, you will already possess some knowledge that is relevant to the syllabus. Don't underestimate the importance of this. It is worth spending some time thinking about how this store of information relates to and can be used to expand and back up the new information that you have learnt on the course. Examiners' Reports have, in the past, referred specifically to the advantages to be gained from this. For example:

Some candidates, perhaps from their work experience, showed a good knowledge of a permit-to-work system and produced reasonable answers.

But be warned. The examiners also pointed out that:

Answers based solely on 'what we do in our organisation' ... do not earn high marks.

17.10 Organising information

You can organise the information in preparation for an exam in several ways.

- ▶ read back through the notes on a regular basis while the course is still in progress; this will help to fix the information in your memory;
- ▶ make revision cards: condense the information down so that it fits on a set of postcards. This makes it possible to carry a lot of information around in your pocket. The activity of condensing the information is revision in itself. This way you can keep your revision material available and spend a few spare moments reading it through, from time to time.

For example: 'Outline the factors that may increase risks to pregnant employees.' On a card, the information could be condensed as shown in Figure 17.1.

Make mind maps (also known as pattern notes): like revision cards, the act of making them is revision in itself. Because they are based on visual images some people find them easier to remember and they can be made as complex or as simple as you like. Use colour and imagery. It will be easier to follow and to recall the information (Buzan). Figure 17.2 shows a mind map based on the report writing section of this book.

Use key words as an aid to memory. For example, a list of key words for 'ways of reducing the risk of a fire starting in the work place' could be reduced to an eight-letter nonsense word, as follows:

FLICSHEV:

- F**lammable liquids – provide proper storage facilities
- L**ubrication – regular lubrication of machinery
- I**ncompatible chemicals – need segregation
- C**ontrol of hot work
- S**moking – of cigarettes and materials, to be controlled
- H**ousekeeping (good) – prevent accumulation of waste
- E**lectrical equipment – needs frequent inspection for damage
- V**entilation – outlets should not be obstructed.

The effort involved in making the list and inventing the word helps to fix the information in your memory.

Learning by rote is a popular learning method in many countries and is very useful for specific learning tasks, such as tables and formulae. But it is not appropriate to this type of syllabus. Rote learning can prevent you from applying what you have learnt to a wide range of situations. If you limit yourself in this way you will be in danger of not having sufficient understanding of the depth of the subject, particularly if you learn set answers to exam questions. The NEBOSH examiners' reports specifically warn against rote learning of set answers. They point out that 'Candidates should prepare themselves for this vocational examination by ensuring their understanding.' Working through old exam papers is very helpful and you can learn a lot by doing revision in this way but don't be tempted to learn a 'perfect' version of an answer as they are all designed to make you think about specific problems that you might encounter in your working life.

Pregnant Employees - Risks

Exposure to chemicals	<ul style="list-style-type: none"> pesticides Lead mutagens (inter-cellular change) teratogens (affect embryo)
biological	(e.g. hepatitis)
Physical	(ionizing radiations extremes of temperature)
manual handling	
ergonomic	(prolonged standing awkward body movements)
Stress	
issues relating to	use/wearing of protective equipment

Figure 17.1 Research factors

REPORT WRITING - MIND MAP

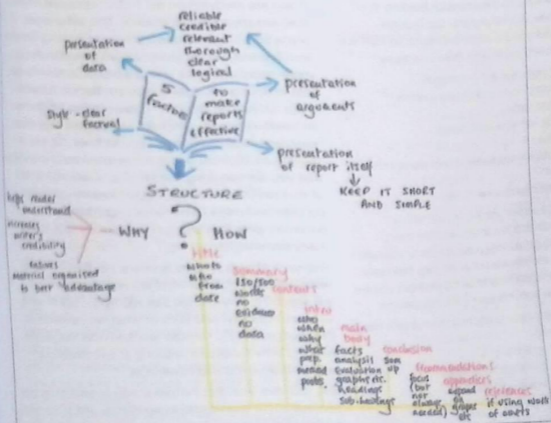


Figure 17.2 Mind map report writing

It is useful to have a range of techniques for memorising, since what works for one person may not work for another (see 17.11). There are several other memory techniques available, but the ones described in this paragraph are the most commonly used.

17.11 Being aware of your learning style

All of us are different and we learn in different ways, so it makes sense to be able to identify your own preferred style of learning. The main learning styles are **visual**, **auditory** and **kinaesthetic** and it helps if you can choose ways of learning and remembering that fit in with your own personal style.

For example, if you are a person who learns in a **visual** way, you may find it easier to understand and recall information when it is presented in the form of diagrams, the use of flip charts, handouts, demonstrations and videos. When you are taking notes, and later in revision, you will perhaps find it more effective to:

- Use colour
- Organise in columns and categories
- Use mnemonics in a visual way (see the 'key word' tip in 17.10)
- Use mind mapping
- Use index cards
- Highlight, circle and underline
- Make posters and/or use Post-it notes.

If you are a person who leans towards learning in an **auditory** way, you will probably find lectures, discussions, dialogue and music are useful, so here are a few ideas to help you to learn more effectively:

- Discussion of new ideas and information
- Recording information as well as taking notes
- Using word association
- Repeating facts with your eyes closed
- Watching videos
- Using rhyme, rhythm and music to help you to retain information
- Using mnemonics aurally (see 17.10).

Maybe you are a person who works best with a **kinaesthetic** approach to learning, and find that touching, feeling and actively doing are the best ways for you to learn. Hands-on activity, role play, simulation and practising skills are likely to be the methods you are most comfortable with. Here are a few possibilities:

- Copying notes repeatedly to organise them in your mind
- Making on-site visits
- Using colour and highlighting
- Making posters and models to aid memory
- Skim reading, then reading in detail
- Taking study breaks
- Revise on an exercise bike.

(Arp, 2014)

This is not to say that people only conform to the visual, the auditory or the kinaesthetic model. Most people will be on a spectrum and use more than one type of learning, but you have probably already identified the one that is prevalent in your learning style and you can use that information to make both the learning process and revision a bit easier.

17.12 How does memory work?

Understanding how your memory works will help you to use it more effectively. In common with other scientific subjects, there is still a lot to be discovered about the workings of the mind, and a considerable amount of disagreement about what has been discovered so far, but psychologists generally seem to agree about the way that memory works.

The process of remembering is divided, roughly, into two sections – short-term and long-term memory. Items that go into short-term memory, if no further attention is paid to them, will fade away and be forgotten. If they are rehearsed they will stay in short-term memory for a while. Think, for example, of how you remember a phone number when you make a call. Storing something in long-term memory requires a greater 'depth of processing', that is to say, more mental activity is required so that:

- (a) information stays in the memory (storage), and
- (b) information can be found when it is needed (retrieval).

If you are studying on the NEBOSH course, it is likely that you are a mature student. This will give you some advantages when it comes to learning. Because your life and work experience will almost always be more comprehensive and of a higher complexity than that of younger students, you are likely to possess more 'schemas' (areas of knowledge) to which new information can be attached, and you will have more experiences already stored in your brain that can provide an explanation for the new pieces of knowledge that you are acquiring. Add to this, a very high level of motivation, a stronger level of incentive towards success and more determined application, and it becomes clear that you, as a mature student, have many advantages.

Research shows that, as learners, we take in 10% of what we read, 20% of what we hear, 30% of what we see, 50% of what we see and hear, 70% of what we ourselves say, and 90% of what we ourselves do (Northedge, 2012). You can see from this that people who are simultaneously working at and studying a subject have a marked advantage.

But, it is also true that mature students tend to be very nervous about exams and assignments and often need a good deal of reassurance and support to enable them to realise their full potential.

How to deal with exams

three stages to taking an exam:

1. Planning and revision;
2. Exam room;
3. The exam.

Candidates who require *special consideration*, there are reasons within NEBOSH to allow extra time or the use of special equipment. If you think you are eligible for reasonable adjustments/special consideration, you should apply to NEBOSH several weeks before the date of the exam. Have a look at the NEBOSH Guide if you think any of this may apply to you.

17.13.1 Planning and revision

It is absolutely essential that you know what you are going to be examined on and what form the exam will take. You should read through the syllabus and if you are concerned about any area of it, this should be raised with your course tutor well before the date of the exam.

Read the Guide to the NEBOSH General Certificate in Occupational Health and Safety and the examiners' reports. After the exams every year, the examiners highlight the most common mistakes made by students (see Section 17.14 on examiners' reports). They also provide useful information about, for example, pass rates, levels attained (distinction, credit, pass, fail), time management and other hints or exam techniques.

You should work through some recent past papers, against the clock, to get used to the 'feel' of the exam. If possible, ask your tutor to set up mock exams and make sure that the papers are marked. Some of the shorter courses will not be able to provide this service, and, if this is the case, do try to do at least one or two timed questions as part of your revision. You may find it difficult at first to write an answer as a first draft. Now that everyone is used to the facilities provided by word processing, you may need to practise writing an answer without being able to edit the text. Past papers, examiners' reports and syllabuses are available from NEBOSH. The website is at www.nebosh.org.uk.

- You will need to know where the exam is to be held and the date and time. If possible, visit the building beforehand to help build confidence about the location, availability of parking and so on.
- Make a chart of the time leading up to the exam. Include all activities, work, leisure and social, as well as the time to be used for revision, so that the schedule is realistic.
- Try to eat and sleep well and take some exercise.
- Revision techniques were covered in the sections on revision and memory earlier in this chapter.

Set realistic targets, then achieve them. Make plans and stick to them.

17.13.2 In the examination room

- ▶ Read through the exam paper very carefully.
- ▶ Check the instructions – how many questions have to be answered? From which section(s)?
- ▶ Make a time plan.
- ▶ Underline **command words**, e.g. 'identify' (see Table 17.1). Using the words in the question when writing the answers will help to keep the answer on track.
- ▶ Stick to the instructions given in the question. A working knowledge of the command words is vital to your success. NEBOSH no longer uses the command word 'sketch', but candidates may use sketches to illustrate their answers where appropriate.
- ▶ Write clearly. Illegible answers don't get marked.
- ▶ Look at the number of marks allocated to a question to pick up clues as to how much time should be spent on it.
- ▶ Mark questions which look possible and identify any that look impossible.
- ▶ It is rarely necessary to answer exam questions in a particular order. Start with the question that you feel most comfortable with since it will help to boost your confidence. Make sure it is clearly identified by number for the examiner.

Table 17.1 Terminology used in NEBOSH exams

Command word	Definition
Identify	To give reference to an item, which could be its name or title. NB: normally a word or phrase is sufficient provided the reference is clear.
Give	To offer for consideration, acceptance, or use of another. NB: give an example of, give the meaning of.
Outline	To indicate the principal features or different parts of. NB: an exhaustive description is not required. What is sought is a brief summary of the major aspects of whatever is stated in the question.
Describe	To give a detailed written account of the distinctive features of a subject. The account should be factual, without any attempt to explain. When describing a subject (or object) a test of sufficient detail would be that another person would be able to visualise what you are describing.
Explain	To provide an understanding. To make an idea or relationship clear. NB: this command word is testing the candidate's ability to know or understand why or how something happens. Is often associated with the words 'how' or 'why'.

- ▶ Answer the question that is set, not the one you wish was on the paper.
- ▶ If ideas for other answers spring to mind while you are writing, jot down a reminder on a separate piece of paper. It is easy to forget that bit of information when you are concentrating on something else.
- ▶ Plan the use of time and plan the answers. Include some time to check over each answer.
- ▶ Stick to the time plan; stick to the point; make points quickly and clearly.

Early marks in an exam question are easier to pick up than the last one or two, so make sure that all the questions are attempted within the time plan. No marks are given for correct information that is not relevant to the question.

Don't be distracted by the behaviour of other students. Someone who is requesting more paper has not necessarily written a better answer; they may simply have larger handwriting. People who start to scribble madly as soon as they turn over the question sheet are not in possession of some extra ability – they simply haven't planned their exam paper properly.

Keep calm, plan carefully, don't panic.

17.13.3 After the exam

If there are several exams to be taken, you need to stay calm, relaxed and confident. It is not a good idea to get into discussion about other people's experiences of the exam. After one exam, focus on the next. If something went wrong during the exam (for example, illness or severe family problems), the tutor and the examining board should be alerted immediately.

17.14 The examiners' reports

17.14.1 A few points from the examiners' reports

The examiners' reports provide information to help candidates and tutors in future exams. They aim to be constructive and to help you towards a better understanding of the syllabus and how you are assessed.

The examiners note that many candidates are well prepared and that their answers are relevant and comprehensive and show that they not only have the necessary knowledge, but that they are able to apply it to the workplace situation.

On the other hand, there are some candidates who appear to be unprepared and the examiners emphasise that good preparation is essential. You will need to study the content of the syllabus, while at the same time understanding how the concepts contained in it apply in the workplace. The examiners also stress the importance of applying the information that you have learned to the question that is asked on the paper. It is

especially important to understand that rote-learning will not lead to success in this type of exam.

Here is a quote from the latest examiners' reports:

In order to meet the pass standard for this assessment, acquisition of knowledge and understanding across the syllabus are prerequisites. However candidates need to demonstrate their knowledge and understanding in answering the questions set. Referral of candidates in this unit is inevitably because they are unable to write a full, well-informed answer to one or more of the questions asked.

Some candidates find it difficult to relate their learning to the questions and as a result offer responses reliant on recalled knowledge and conjecture and fail to demonstrate a sufficient degree of knowledge and understanding. Candidates should prepare themselves for this vocational examination by ensuring their understanding, not rote-learning pre-prepared answers. The section on 'common pitfalls' warns about common mistakes that are made by people taking these exams. Here are seven things which often cause people to fail to reach their full potential:

- ▶ Failure to apply the basic principles of exam technique can make the difference between passing the exam and being referred.
- ▶ Some candidates do not attempt all the required questions or they fail to provide complete answers. Even if your mind goes blank, do make an attempt to answer a question that is compulsory. Applying basic health and safety management principles can generate points that will add to your mark.
- ▶ If you provide information that is relevant to the topic but not relevant to the question that is set, the information cannot gain any marks. Always answer the question that is set.
- ▶ Knowledge of the command words is essential (see Table 17.1). They are the instructions that guide you on the depth of answer that is required. For example, if a question asks you to 'describe' something, you will not get many marks if you 'outline' it.
- ▶ Where a question is divided into sub-sections, you need to indicate clearly which part of the question you are answering. Use the numbering from the question in your answer. If your answer is structured to address the different parts of the question, that will help to draw out the points you need to make in your answer.
- ▶ Time planning is absolutely vital. If you spend a lot of time on one answer and give a lot of unnecessary information, you may be left with insufficient time to address all the questions.
- ▶ If you have doubts about the legibility of your handwriting, practise writing at speed. The examiner has to be able to read it to mark it.

Examiners also point out that you do not need to write a page for each section of a question.

2 Marks for practice revision questions

You have been asked about the allocation of marks to practice revision questions shown at the end of this chapter. However, since the marks awarded to each section of a question can vary, only general guidance can be given.

One- or two-part questions are given 8 marks with a maximum of 2 marks awarded to any part. Questions with three or more parts are given 20 marks with a minimum of 4 marks for each part.

NEBOSH exam questions have a similar format and distribution of marks.

17.15 Conclusion

Preparing health and safety exams and assessments has much in common with any other subject being examined. Read the questions carefully and plan your answers.

The old carpenter's saying 'Measure twice, think twice, cut once' can be applied to exam technique:

Read twice, think twice and write once.

17.16 Further information

Arp, D. Standards Manager NEBOSH (2014) Presentation to course providers 'Preparing Students for Assessment'.

Buzan, T. A wide range of study skills books by this author can be found at www.thinkbuzan.com

Guide to the NEBOSH General Certificate.

Leicester, Coventry and Nottingham Universities Study Skills booklets.

NEBOSH Examiners' Reports

NEBOSH Guidance on command words used in learning outcomes and question papers (March 2013) online.

Northedge, A. 2012 The Good Study Guide. The Open University. ISBN 978 0 7492 5974 7.

Free learning resources from the Open University at www.open.edu/openlearn/free-course

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CHAPTER

18

specimen answers to practice questions

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GC3 – the practical application ▶ 573

Appendix 18.1 Practical application report ▶ 577

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This chapter covers:

1. The depth of answer needed for long and short NEBOSH questions
2. The different types of questions used by NEBOSH
3. The requirements for the practical inspection and the management report

18.1 Introduction

The NEBOSH National General Certificate is assessed by two written examination papers (NGC1 – Management of health and safety and GC2 – Control of workplace hazards) and a practical assessment (GC3 – Health and safety practical application). Both examination papers and the practical application must be passed within a five-year period so that the NEBOSH National General Certificate may be awarded.

NEBOSH is concerned about malpractice problems if published NEBOSH questions are used in publications so the questions used in this book are not used in NEBOSH examinations. In this chapter, specimen answers are given to one long and two short questions for each of the two written papers. A specimen practical assessment and management report is also given for the practical application. It is important to stress that there are no unique answers to these questions but the answers presented should provide a useful guide to the depth and breadth expected by the NEBOSH examiners. Candidates are strongly advised to read past examiners' reports which are published by NEBOSH and available on their website. These are very useful documents because they indicate some common errors made by candidates. Finally, learning by 'rote' of certain key words should be discouraged since examiners always expect such key words to be put into a context that is relevant to the particular examination question.

18.2 The written examinations

The previous chapter on study skills gives some useful advice on tackling examinations and should be read in conjunction with this chapter. NEBOSH has a commendably thorough system for question paper preparation to ensure that no candidates are disadvantaged by question ambiguity. Candidates should pay particular attention to the meaning of command verbs, such as 'outline', used in the questions.

Candidates have always had most difficulty with the command verb 'outline' and, for this reason, several of the specimen questions chosen use 'outline' so that some guidance on the depth of answer expected by the examiners can be given.

It is difficult to give a definitive guide on the exact length of answer to the examination questions because some expected answers will be longer than others and candidates answer in different ways. As a general guide, for the long answer question on the examination

paper, it should take about 25 minutes to write about one and a half pages (550–620 words). Each of the 10 short answer questions require about half a page of writing (170–210 words).

18.2.1 NGC1 – Management of health and safety**Paper 1 – Question 1**

- (a) **Outline** the factors that should be considered when selecting individuals to assist in carrying out risk assessments in the workplace. (5)
- (b) **Describe** the key stages of a general risk assessment. (5)
- (c) **Outline** a hierarchy of measures for controlling exposures to hazardous substances. (10)

Answer:

- (a) The most important factor is the competence and experience of the individuals in hazard identification and risk assessment. Some training in these areas should offer evidence of the required competence. They should be experienced in the process or activity under



Figure 18.1 Select a competent and experienced person to carry out a risk assessment

assessment and have technical knowledge of any plant or equipment used. They should have knowledge of any relevant standards relating to the activity or process.

They must be keen and committed but also aware of their own limitations. They need good communication skills and be able to write interesting and accurate reports based on evidence and the detail found in health and safety standards and codes of practice. Some IT skills would also be advantageous. Finally, the views of their immediate supervisor should be sought before they are selected as team members.

There are five key stages to a risk assessment suggested as follows:

The first stage is hazard identification, which involves looking at significant hazards which could result in serious harm to people. Trivial hazards should be ignored. This will involve touring the workplace concerned looking for the hazards in consultation with workers themselves and also reviewing any accidents, ill-health or incidents that have occurred.

Stage 2 is to identify the persons who could be harmed - this may be workers, visitors, contractors, neighbours or even the general public. Special groups at risk, like young persons, nursing or expectant mothers and people with a disability, should also be identified.

Stage 3 is the evaluation of the risks and deciding if existing precautions or control measures are adequate. The purpose is to reduce all residual risks after controls have been put in to as low as is reasonably practicable. It is usual to have a qualitative approach and rank risks as high, medium or low after looking at the severity of likely harm and the likelihood of it happening. A simple risk matrix can be used to get a level of risk.

The team should then consider whether the existing controls are adequate and meet any guidance or legal standards using the hierarchy of controls.

Stage 4 of the risk assessment is to record the significant findings which should be done. The findings should include any action that is necessary to reduce risks and improve existing controls, preferably set against a timescale. The information contained in the risk assessment must be disseminated to workers and discussed at the next health and safety committee meeting.

Stage 5 is a timescale set to review and possibly revise the assessment which must also be done if there are significant changes in the workplace or the equipment and materials being used.

The various stages of the usual hierarchy of risk controls are in **bold** in this answer.

Elimination or substitution is the best and most effective way of avoiding a hazard and its associated risks. Elimination occurs when a process or activity is totally abandoned because the associated risk is too high. Substitution describes the use of a less hazardous form of the substance. There are many examples of substitution, such as the use of water-based rather than oil-based paints and the use of asbestos substitutes.

In some cases it is possible to **change the method of working** so that exposures are reduced, such as the use of rods to clear drains instead of strong chemicals. It may be possible to use the substance in a safer form; for example, in liquid or pellets to prevent dust from powders. Sometimes the pattern of work can be changed so that people can do things in a more natural way, for example, by encouraging people in offices to take breaks from computer screens by getting up to photocopy or fetch documents.

Reduced or limited time exposure involves reducing the time that the employee is exposed to the hazardous substance by giving the worker either other work or rest periods.

If the above measures cannot be applied, then the next stage in the hierarchy is the introduction of **engineering controls**, such as isolation (using an enclosure, a barrier or guard), insulation (used on any electrical or temperature hazard) or ventilation (exhausting any hazardous fumes or gases either naturally or by the use of extractor fans and hoods). If ventilation is to be used, it must reduce the exposure level for employees to below the occupational exposure limit (OEL).

Housekeeping is a very cheap and effective means of controlling risks. It involves keeping the workplace clean and tidy at all times and maintaining good storage systems for hazardous substances.

A **safe system of work** describes the safe method of performing the job.

Training and information are important but should not be used in isolation. Information includes such items as signs, posters, systems of work and general health and safety arrangements.

Personal protective equipment (PPE) should only be used as a last resort. There are many reasons for this. It relies on people wearing the equipment at all times and it must be used properly.

Where necessary **health surveillance** should be introduced to monitor the effects on people and air quality may need to be monitored to check exposure.

Welfare facilities, which include general workplace ventilation, lighting and heating and the provision of

drinking water, sanitation and washing facilities, are the next stage in the hierarchy.

All risk control measures, including **training and supervision**, must be **monitored** by competent people to check on their continuing effectiveness. Periodically the risk control measures should be **reviewed**. Monitoring and other reports are crucial for the review to be useful. Reviews often take place at safety committee and/or at management meetings. A serious accident or incident should lead to an immediate review of the risk control measures in place.

Finally, special control requirements are needed for carcinogens.

- (b) **Outline** the measures that could be taken to minimise the risks to young workers. (4)

Answer:

- (a) Young workers have a lack of experience, knowledge and awareness of risks in the workplace. They are often willing to work hard and want to please their supervisor and can become over-enthusiastic. This can lead to the taking of risks without the realisation of the consequences. Some younger workers have underdeveloped communication skills and a limited attention span. Their physical strength and capabilities may not be fully developed and so they may be more vulnerable to injury when manually handling equipment and materials. They are also more susceptible to physical, biological and chemical agents such as temperature extremes, noise, vibration, radiation and hazardous substances.

- (b) A specific risk assessment should be made before a young person is employed. This should help to identify the measures which should be taken to minimise the risks to young people.

Measures should include:

- ▶ additional supervision to ensure that they are closely looked after, particularly in the early stages of their employment;
- ▶ induction and other training to help them understand the hazards and risk at their work place;
- ▶ not allowing them to be exposed to extremes of temperature, noise or vibration;
- ▶ not allowing them to be exposed to radiation, compressed air and driving work;
- ▶ carefully controlling levels of exposure to hazardous materials so that exposure to carcinogens is as near zero as possible and other exposure is below the occupational exposure limits which are set for adults;
- ▶ not allowing them to use highly dangerous machinery like power presses and circular saws, explosives and mechanical lifting equipment such as fork-lift trucks;
- ▶ restricting the weight that young persons manually lift to well below any weights permitted for adults.

There should be clear lines of communication and regular appraisals. A health surveillance programme should also be in place.

18.2.2 GC2 – Control of workplace hazards

Paper 2 – Question 1

A glassworks produces covers for streetlights and industrial lighting. The process involves molten glass being blown by hand and shaped in moulds.

Paper 1 – Question 2

Outline ways in which employers may motivate their workers to comply with health and safety procedures. (8)

Answer:

Motivation is the driving force behind the way a person acts or the way in which people are stimulated to act. The best way to motivate workers to comply with health and safety procedures is to improve their understanding of the consequences of not working safely, their knowledge of good safety practices and the promotion of their ownership of health and safety. This can be done by effective training (induction, refresher and continuous) and the provision of information showing the commitment of the organisation to safety and by the encouragement of a positive health and safety culture with good communications systems. Managers should set a good example by encouraging safe behaviour and obeying all the health and safety rules themselves even when there is a difficult conflict between production schedules and health and safety standards. A good working environment and welfare facilities will also encourage motivation. Involvement in the decision-making process in a meaningful way, such as regular team briefings, the development of risk assessments and safe systems of work, health and safety meetings and effective joint consultation arrangements, will improve motivation as will the use of incentives. However, there are other important influences such as recognition and promotion opportunities, job security and job satisfaction. Self-interest, in all its forms, is a significant motivator. Although somewhat negative, it is necessary sometimes to resort to disciplinary procedures to get people to behave in a safe way.

Paper 1 – Question 3

- (a) **Explain** why young persons may be at a greater risk from accidents at work. (4)

- (a) **Identify FOUR** health effects that may be caused by working in the hot conditions of the glass factory. (4)
- (b) **Describe** measures that could be taken in order to minimise the health effects of working in such hot environments. (6)
- (c) **Outline** the factors relating to the *task* and the *load* that may affect the risk of injury to a worker engaged in stacking the finished product onto racking. (10)



Figure 18.2 Glassblowing factory

Answer:

- (a)
- heat exhaustion due to high ambient temperature;
 - dehydration due to excessive sweating;
 - heart stress and, in extreme cases, heat stroke due to prolonged exposure to high ambient temperatures;
 - burns from handling hot molten glass;
 - the eyes can also be affected by high-intensity light from looking at molten glass (additional answer).
- (b) The health effects of working in a hot environment can be reduced by the gradual acclimatisation of new workers. Even after the initial acclimatisation, frequent rest periods will be necessary to allow the body to acclimatise to the hot conditions on a daily basis. Rest should be in cool areas which in summer may need to be artificially cooled. If, in addition, the humidity is high, a good supply of ventilation air will be needed to help control sweating. Adequate supply of cold drinking water is essential to avoid dehydration.
- Workers in hot conditions should wear appropriate clothes, which must be a compromise between lighter garments to promote evaporation of perspiration, and protective clothes to prevent burns. It will be necessary to provide protective leather or fire-resistant aprons and gloves, and appropriate eye and face protection such as eye visors. Visors may need to be supplied with cooling

air to keep people cool and permit proper vision. Screens could also be provided to protect workers from radiant heat. Periodic health surveillance should be provided.

Finally, workers should be trained to recognise ill-health effects on others.

- (c) The **task** should be analysed in detail so that all aspects of manual handling are covered including the use of mechanical assistance. This will involve a manual handling risk assessment. The number of people involved and personal factors, such as age and health, should also be considered. A satisfactory body posture must be adopted with the feet firmly on the ground and slightly apart. To avoid work-related upper limb disorders (WRULDs) there should be no stooping or twisting of the trunk; it should not be necessary to reach upwards as this will place additional stresses on the arms, back and shoulders. The further the load is held or manipulated from the trunk, the more difficult it is to control and the greater the stress imposed on the back. These risk factors are significantly increased if several of them are present at the same time. The load should not be carried over excessive distances (greater than 10 m). The frequency of lifting, and the vertical and horizontal distances the load needs to be carried (particularly if it has to be lifted from the ground and/or placed on a high shelf) can lead to fatigue and a greater risk of injury. If the loads are handled whilst the individual is seated, the legs are not used during lifting and stress is placed on the arms and back.

There should not be excessive pulling, pushing or sudden movements of the load. The state of floor surfaces and the footwear of the individual should ensure that slips and trips are avoided.

There should be sufficient rest or recovery period and/or the changing of tasks particularly in the ambient temperatures of the glassworks. This enables the body to recover more easily from strenuous activity.

The imposition of a high rate of work is a problem with some automated production can be addressed by spells on other work away from the line.

The handling capability of an individual is approximately halved when he/she becomes a member of a team. Visibility, obstructions and the roughness of the ground must all be considered when team handling takes place.

The **load** must also be carefully considered during the assessment – it may be too heavy. The maximum load that an individual can lift will depend on the capability of the individual and the position of the load relative to the body. There is therefore no safe load but guidance is available from health and

safety literature, which does give some advice on loading levels. If the load is too bulky or unwieldy, its handling is likely to pose a risk of injury. Visibility around the load is important, as is awareness that it may hit obstructions or become unstable in windy conditions. The position of the centre of gravity is important for stable lifting – it should be as close to the body as possible; however, this may be difficult if the load is hot, such as in boxes or trays of recently blown glass. They should be allowed to cool sufficiently.

The load becomes difficult to grasp when it is carried over slippery surfaces, has rounded corners or there is a lack of foot room. Sometimes the contents of the load are likely to shift. This is a particular problem when the load is a container full of smaller items, such as small glass covers. These are glass components which may shatter if dropped and leave shards of glass to be carefully cleared up. The load is likely to be hot and may be sharp as well in places or when broken so that PPE, such as leather gloves and aprons along with eye protection, may be required.



(a)



(b)

Figure 18.2 Flat roof construction (a) using hand saws and top boards; (b) using a chainsaw and proprietary roof tiles.

Paper 2 – Question 2

Outline the precautions that may be needed when carrying out repairs to the flat roof of a building. (6)

Answer:

Roof work is hazardous and requires a specific risk assessment and method statement prior to the commencement of work so that the required precautions may be identified. The particular hazards are fragile roofing materials, including those materials which deteriorate and become more brittle with age and exposure to sunlight, exposed edges, unsafe access equipment and falls.

There must be suitable means of access such as scaffolding, ladders and crawling boards. Suitable edge protection will be needed in the form of guard rails to prevent the fall of people or materials, and access must be restricted to the area below the work using visible barriers. Warning signs indicating that the roof is fragile, should be displayed at ground level. Protection should be provided in the form of covers where people work near to fragile materials and roof lights. The means of transporting materials to and from the roof may require netting under the roof and even weather protection.

Precautions will be required for other hazards associated with roof work, such as overhead services and obstructions, the use of equipment such as gas cylinders and bitumen boilers and manual handling.

Finally, only trained and competent persons must be allowed to work on roofs and they must wear footwear having a good grip. It is good practice to ensure that a person does not work alone on a roof.

Paper 2 – Question 3

For **EACH** of the following agents, **outline** the principal health effects **AND identify** a typical workplace situation in which a person might be exposed:

- carbon monoxide (2)
- asbestos (2)
- legionella bacteria (2)
- hepatitis virus. (2)

Answer:

- Carbon monoxide is a colourless, tasteless and odourless gas. It causes headaches and breathlessness and, at higher concentrations, unconsciousness and death. The most common occurrence of carbon monoxide is in exhaust gas from a vehicle engine. Working in a vehicle repair garage without proper ventilation to exhaust gases would expose a person to carbon monoxide fumes.
- Asbestos produces fine fibres which can become lodged in the lungs. This can lead to asbestosis (scarring of the lungs), lung cancer or mesothelioma – cancer of the lining of the lung.

Asbestos can be found in buildings, in ceiling tiles and as lagging around heating pipes. When these pipes are disturbed, the asbestos fibres become airborne and inhalable affecting those engaged in maintenance or demolition work.

Legionella is an airborne bacterium and is found in a variety of warm water sources between 20°C and 45°C. It produces a form of pneumonia caused by the bacteria penetrating the alveoli in the lungs. The disease is known as Legionnaires' disease and has symptoms similar to influenza. The three most common systems at risk from the bacteria are water systems that incorporate a cooling tower, air conditioning units, and showers. People working on these systems or working in the area of infected systems are at risk, particularly if they are over 45 years of age and it affects men more than women.

Hepatitis is a disease of the liver and can cause high temperatures, nausea, jaundice and liver failure. The virus can be transmitted from infected faeces (Hepatitis A) or by infected blood (Hepatitis B and C). Hospital workers and first-aiders who come into contact with blood products are at risk of hepatitis.

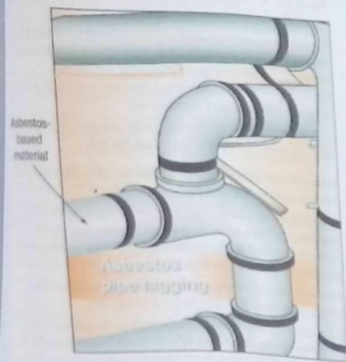


Figure 18.4 Asbestos pipe lagging

18.3 Unit GC3 – Health and Safety Practical Application

Guidance and information for accredited course providers and candidates is essential reading before attempting the practical application. The guide contains details on the aims of the application, the rules to be followed, the breadth and depth of observations and

management report expected and the marks. The candidates undertake the practical application at their own workplace. There is also a great emphasis on the standard and content of the report and recommendations following the observations at the workplace.

The NEBOSH Practical application Guidance (2013) (under revision at Aug 2015) is represented in Section 18.3.1. A specimen practical application associated observations and management recommendations given in Section 18.3.2. It is important to note that this specimen practical application (copy it) must not be copied as this is malpractice.

18.3.1 Requirements of the practical application

The aim of the practical application, Unit GC3, is to assess a candidate's ability to complete the practical application in two activities:

- ▶ To carry out unaided a safety inspection of a workplace, identifying the more common hazards, deciding whether they are adequately controlled, and where necessary, suggesting appropriate and effective control measures.
- ▶ To prepare a report that persuasively urges management to take appropriate action, explaining why such action is needed (including reference to possible breaches of national standards), identifying, with due consideration of realism and practicability, the remedial measures that should be implemented.

This will require candidates to apply the knowledge and understanding gained from their studies of Units NGC1 and GC2 in a practical environment and to carry out an evaluation of information gathered during the inspection. The time allowed for the assessment is not restricted but candidates must complete the inspection and the report within the time allowed.

The practical application may be submitted in the candidate's own handwriting or be word processed.

The submission must include:

- ▶ completed observation sheets covering a range of hazards and good practice, suitable control measures and timescale for action;
- ▶ an introduction and executive summary;
- ▶ main findings of the completed inspection;
- ▶ conclusions which summarise the main hazards identified in the candidate's workplace;
- ▶ completed recommendations table.

The practical application must be carried out at the candidate's own workplace. The workplace must be large enough to provide a sufficient range of hazards in the areas covered to provide an adequate basis for identification. If the workplace is very small, the candidate should limit the area considered.

candidate does not have access to a workplace, the course provider should be consulted to help in making arrangements for the candidate to carry out the practical application at suitable premises. Providers seeking to run the practical in this way should contact NEBOSH for advice and approval.

Date of assessment

Assessment of the practical unit (GC3) must normally take place **within 10 working days of** (before or after) the date of the NGC1 and/or GC2 written papers (the 'date of the examination'). Completion of study for both NGC1 and GC2 is recommended in order to undertake the practical application unit GC3.

Completion of observation sheets

Candidates will be supplied with a sufficient number of observation sheets from a course provider which may be photocopied for the purpose. An example observation sheet is given in Appendix 18.2. The observation sheets must be completed during the inspection. Only brief details of each hazard are required including where the hazard was located and the nature of the hazard. For example, 'housekeeping could be better' does not give enough information about the particular hazard. Candidates should avoid the tendency to simply identify the tasks being undertaken, or the equipment that is being used, instead of providing an indication of how the tasks or items of equipment pose a risk.

The observation sheets should be completed by:

- ▶ identifying, in the left-hand column, any hazards, consequences and examples of good practice observed during the inspection;
- ▶ commenting in the next column, on the adequacy of existing controls and identifying any immediate, medium-term and long-term remedial actions needed;
- ▶ stating, in the right-hand column, a reasonable timescale for the actions identified.

There should be sufficient information on the observation sheets to enable the candidate to complete a report to management on their findings. Candidates are also advised to make notes on the area inspected, including activities taking place, in order to complete the introduction to their report. Whilst poor spelling and grammar will not be marked or penalised, if the assessor is unable to read or to understand the notes made by candidates during their inspection then invariably fewer marks will be awarded than would otherwise have been the case. The practical application may be submitted in the candidate's own handwriting or word processed.

Marking of observation sheets

Range and outline of hazards and consequences (15 marks)

Candidates should outline 20 uncontrolled hazards to gain maximum marks, but are strongly recommended to outline more than 20 (but no more than 30) in case of duplication or inappropriate hazards being outlined. Candidates must demonstrate their understanding of how identified hazards have the potential to cause harm, for example, boxes stored on the floor may cause obstruction of access, egress routes and/or a potential of musculoskeletal injury if lifted. This information must be recorded in the 'Hazards and consequences' column. Candidates are expected to identify different types of hazards such as hazardous substances, fire, electrical, work equipment, ergonomic, housekeeping, noise, vibration, transport, manual handling and health hazards and should also consider if there are any welfare and environmental problems. At least four different types of hazard must be included for maximum marks. In addition candidates are expected to comment on situations where there is adequate control of hazards and where good practice is being observed, although candidates should place the emphasis on uncontrolled hazards. A maximum of 1 mark is available for good practice.

Candidates who repeat identical hazards will only be awarded ONE mark for that hazard (e.g. inadequate labelling of an unknown chemical substance). Candidates should focus on physical conditions and not on poor policies and procedures.

It is important to note that credit can only be gained in this section for clearly identified hazards.

Identification of suitable control measures and timescales (15 marks)

Candidates are expected to give thought to what is required to immediately control the risk from each outlined hazard **AND** to identify the need for long-term actions to control the risk.

This requires candidates to distinguish between the symptoms and the root causes of hazards.

For example, the immediate action on a spillage may be 'clean up spillage and inform supervisor' whereas medium-term actions might include appropriate supervisor training, regular inspections and investigation of the source of the leak. A further longer term action may be to modify the work process to tackle the root cause. The proposed control measures must not only remove or control the hazard but must also be realistic in terms of timescales. Candidates should indicate a measure of time, e.g. supervisor training to be completed within three months.

Existing controls are in place and considered adequate, candidates should consider any measures required to maintain this level of control. Candidates should avoid generic phrases being repeatedly used, e.g. 'monitor' and 'train staff'. Candidates should give appropriate clarification by giving examples of appropriate monitoring and the type of training required.

Candidates should be aware that if unsuitable control measures are suggested full marks cannot be awarded. Short-term measures to improve housekeeping will do little to improve the lack of safety management systems and procedures evidenced by materials and equipment left lying around.

Candidates should also note that where the hazard is not clearly outlined full credit cannot be gained for control measures as assessors will be unable to determine appropriateness of the measures proposed.

Completion of report

Candidates should use the 'Candidate report template' used in Appendix 18.1 to structure their report. The length of the report should be between 700 and 1,000 words and should not simply duplicate the observation sheets. Candidates can consult reference books when preparing the report, but plagiarism will be dealt with as malpractice.

The report should not contain photographs, printed text or any other extraneous material.

The report should be written in such terms that a manager would be able to take reasonable action based on facts. Reports based on unsupported generalities and those that simply reiterate the contents of the observation sheets will be awarded low marks.

Candidates should aim to complete their report in one hour.

If none of the criteria to award marks is met, then candidates should be aware that zero marks will be awarded.

Marking of report

Candidates are advised to refer to the marking sheet and the marking matrix given in the NEBOSH Guidance document for NEBOSH General Certificate Health and Safety Practical Application (GC3).

Report – Introduction and executive summary

Introduction providing an overview of the chosen area (5 marks)

Candidates should start with the details of the inspection, stating where and when the inspection took place. A clear and appropriate description of the chosen area and of the activities occurring in the area should be given.

Executive summary (5 marks)

The executive summary should be written after the candidate has completed the rest of the report but it should be inserted at the beginning of the report. The purpose of the executive summary is to provide a **concise** overview of the important points arising from the work and **summarise** the main conclusions and recommendations arising from it.

An executive summary should provide sufficient information to enable a busy manager to make a decision as to whether or not to read the full report and to provide a persuasive case for implementation of recommendations made.

Report – Main findings of the inspection

The main findings of the inspection should form the main body of the report and include the following aspects:

The report should be well structured, the appropriate length and not duplicate observation sheets. The report should be concise, readable and highly selective in terms of action required by management. Candidates should include balanced arguments on why action is needed and explain the effect it would have on the standards of health and safety at the workplace and the possible effects on the business overall.

Quality of interpretation of findings and clear references to strengths and weaknesses (15 marks)

There should be a logical progression from the issues identified on the observation sheets.

The key issues should be appropriately selected and discussed, and should not include any hazards not outlined on the observation sheets and does not duplicate the observation sheets.

Identification of possible breaches of legislation and standards (5 marks)

Candidates should be able to identify legislation e.g. Manual Handling Operations Regulations, standards and conventions listed in the syllabus that may have been infringed. Credit will also be given for reference to appropriate local standards.

Candidates must ensure that any legislation, standards or convention referenced is relevant to the area/location inspected and must demonstrate a clear understanding of the reasons for the breaches. Candidates should identify a minimum of five breaches.

Persuasiveness/conciseness/technical content (10 marks)

The candidate must explain why management need to take action including clear legal, moral and financial arguments why such action is needed. Reference can be made to the list of observation and recommended actions, calling particular attention to any recommendations which could be

a high cost in terms of finance, inconvenience or time.

Financial benefits, such as increased productivity, may also accrue from making appropriate changes to safety systems. The possible costs of not taking action should be included.

Report – Conclusions and recommendations

Clear and concise conclusions which are clearly related to report findings and are effective in convincing management to take action (15 marks)

This section should provide a concise summary of the findings identified in the main body of the candidate's report. The conclusions should not introduce new issues or additional factors.

Recommendations which present realistic actions to improve health and safety in the chosen area (15 marks)

Candidates should include recommendations based upon their conclusions.

Recommendations must be presented using the recommendations table used in Appendix 18.1. The recommendations must be realistic, appropriately prioritised and have appropriate resource implications. Candidates are not expected either to know or to estimate actual costs but should demonstrate that they are aware of cost implications. For example, candidates recommending the complete resurfacing of a site roadway because of a small pothole, without commenting on its overall condition, will receive low marks. If training is recommended as a solution to a problem, candidates should indicate if this is likely to require a few hours of work-based instruction

or several days of more costly off-the-job training. It is the assessment of magnitude of the cost that is important, rather than precise figures, e.g. candidates may refer to the number of worker hours as a measure of cost.

Recommendations should be prioritised. The most pressing issues, those which present the highest risk levels and those that can be done immediately at little or no cost, should be addressed first. Target dates should be included, for example, 'plus one week' or 'plus three months'.

If none of the criteria to award marks is met, then zero marks will be awarded.

Important note

The guidelines outlined above and the following specimen practical application are completely valid at the time of publication of this book. However, NEBOSH reviews these guidelines and the format used in the two appendices from time to time so that it is important for course providers and others to consult the NEBOSH website periodically to check whether the guidelines and the report format have been amended. The specimen practical application is given as an illustration only.

18.3.2 Specimen practical application

The specimen practical assessment took place in a small joinery (woodworking) facility used to train 20 carpentry and joinery trainees and produce window frames for use on various building projects. There are five employees, two supervisors, two technicians and an administrator, who administers the training scheme and liaises with the building projects.

The observations made may be seen in Appendix 18.2 and Appendix 18.1 is a specimen candidate report.

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APPENDIX 18.1 Practical application report

UNIT GC3 – THE HEALTH AND SAFETY PRACTICAL APPLICATION

Candidate report form

Student number: **C9887**

Location: **S & J Joinery Training Workshops**

Date of review: **27/January/2010**

Introduction including overview of area inspected and activities taking place

This report follows a health and safety inspection of the workshops and welfare facilities at S & J Joinery Training Workshops which is a small joinery (woodworking) facility situated in a self-contained building.

The facility is used to train 20 carpentry and joinery trainees and produce window frames for use on various building projects for local construction firms. The average age of the trainees is 24, although a minority of them is under 18 years. There are five employees, two supervisors, two technicians and an administrator, who administers the training scheme and liaises with the customers.

Within the building are two workshops – a bench and a machine workshop – and an administration office, welfare facilities, a rest room, two lecture rooms and a storeroom. The inspection only took place in the workshops and included the welfare facilities. Therefore, the assessment excluded the administration office, rest room and lecture rooms. The observations are listed in Appendix 18.2 attached to this report.

Executive summary

There have been no serious accidents since records began some five years ago although there have been several minor ones. This record appears to have led to a relaxation in the monitoring of standards. Several inexpensive improvements in the health and safety management systems and safeguards are recommended. These improvements will lower the risk of injury to the workforce. This will not only lead to better protection of individuals but also satisfy many health and safety legal requirements.

These legal requirements involve fire precautions, the machine shop, manual handling and electrical equipment leading to breaches of the Health and Safety at Work etc. Act (HSWA), the Management of Health and Safety at Work Regulations (MHSWR), the Regulatory Reform (Fire Safety) Order (Fire Regs), the Provision and Use of Work Equipment Regulations (PUWER), the Personal Protective Equipment at

Work Regulations (PPE Regs), the Electricity at Work Regulations and the Workplace Regulations. Any of these breaches could attract enforcement action from the HSE.

The most serious concern is the lack of appropriate guarding on the table saw and circular saw. Neither of these machines must be used until adequate guarding is in place. Other areas of concern are:

1. A lack of effective trainee supervision on health and safety matters.
 2. Inadequate fire and emergency arrangements.
 3. The lack of a specific risk assessment that covers the activities of the trainees.
 4. All risk and COSHH assessments must be reviewed as a matter of urgency.
 5. The presence of several slip, trip and manual handling hazards.
 6. The lack of a review of all risk assessments, particularly those concerning substances hazardous to health.
- Greater involvement by the trainee supervisors in the monitoring of health and safety issues in a proactive manner in both workshops will produce considerable improvements in overall health and safety performance. This monitoring should cover specific issues such as the wearing of personal protective equipment (PPE) to general housekeeping issues ensuring clean and tidy workshops.

These improvements, together with those listed below as recommendations, will bring long-term benefits to the company by reducing the risk of injury and ill-health to the workforce and improvements to the quality of the training.

Main findings of the inspection

It was noted during the inspection that the company is very successful in attracting trainees and in the supply quality window frames to local construction firms. There were several examples of good practice and these are commended (the effective use of health and safety posters is an example). However, it is apparent from observations made during the inspection that there are a number of hazards in the two workshops that present significant safety and health risks which need to be addressed by the company.



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GC3 – THE HEALTH AND SAFETY PRACTICAL APPLICATION

Candidate's observation sheet

Sheet number 2 of 5

Student name: J Brown

Student number: C 9887

Place inspected: S & J Joinery Training Workshops

Date of inspection: 27/January/2015

Observations	Control measures	Timescale
Hazards and consequences	Immediate and longer-term actions	
GENERAL OBSERVATIONS (Cont)		
6. Risk of slips, trips and falls due to trailing cables in both workshops. Slips, trips and falls are the most common causes of accidents in the workplace. The trailing cables also present a risk of electric shock.	Fix covers over cables and re-route them away from busy walkways. Reorganise workshop layout and/or work activities to reduce risk of tripping. Install additional power sockets to reduce the need for long trailing cables.	Immediate 1 week 6 months
7. Timber left lying on floor of both workshops – slip, trip and fall hazard. This could cause injuries to individuals who do not see the obstructions on the floor.	All unused timber must be stacked in the corner of workshop or in the adjacent empty room. Suitable shelving should be erected to store timber safely. Only store a day's requirement in the workshops. Include this arrangement in future training and monitor. Decide on a future strategy for timber storage and management.	Immediate 2 weeks 6 months
8. First-aid box is fully and properly stocked and appropriate notices displayed in each workshop.	This is commendable and no action is required other than monitoring the contents of the first-aid box to ensure that it is refilled.	Each week
9. No trained first-aider in the building. If required, help is obtained from next building. Help may not be available when needed.	Appoint at least 1 member of staff (preferably 2) to be trained as a first-aider. Also an Appointed Person must be nominated to contact the emergency services when necessary.	3 months
10. Risk of back injuries from lifting heavy lengths of timber and manufactured window frames – likely to cause back and shoulder injuries leading to sickness leave. (Manual Handling Regs)	Ensure that timber lengths are always lifted by at least 2 persons and window frames by 4 persons. Undertake a manual handling risk assessment to see whether mechanical assistance can be used. Give everyone a basic manual handling training course including supervisors. Monitor activities regularly.	Immediate Immediate 2 weeks 1 month
11. Several useful posters on manual handling, noise and the correct use of tools and machines, displayed in both workshops.	This is to be commended. May need updating in the longer term. Keep under review at the health and safety committee.	Every 3 months
12. Lighting levels throughout were good.	No action is required but keep under review.	

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GC3 - THE HEALTH AND SAFETY PRACTICAL APPLICATION

Candidate's observation sheet

Sheet number 3 of 5

Student name: J Brown

Student number: C 9887

Place inspected: S & J Joinery Training Workshops

Date of inspection: 27/January/2015

Observations	Control measures	Timescale
Hazards and consequences	Immediate and longer-term actions	
GENERAL OBSERVATIONS (Cont.)		
13. There were several instances of torn gloves and scratched safety glasses on the benches in the 2 workshops. The gloves will be ineffective in protecting workers from injury and the scratched safety glasses may cause workers to make serious mistakes. (PPE Regs)	<p>Replace gloves and glasses.</p> <p>Ensure that all PPE is properly stored and maintained. Prominent notices should be displayed and all infringements recorded.</p> <p>Review all PPE risk assessments and monitor that it is being used.</p> <p>Ensure that trainees receive instruction on the correct use of PPE.</p>	<p>Immediate</p> <p>1 month</p> <p>1 month</p> <p>At induction</p>
14. Toilet and washing facilities were satisfactory and cleaned on a regular basis. Barrier cream was provided and trainees instructed to use it. 1 toilet door lock was broken.	<p>A good cleaning regime is in place.</p> <p>Repair toilet door lock.</p> <p>Monitor cleanliness of toilets.</p>	<p>Immediate</p> <p>Daily</p>
15. Heating levels were low throughout the building and the workshops were cold. Low temperatures can reduce workers' performance and awareness of risks – increased risk of injury.	<p>Check all room temperatures.</p> <p>Have boiler and heating system checked and, if necessary, provide auxiliary heating.</p> <p>Monitor to ensure that a reasonable temperature is maintained.</p> <p>This could be a costly problem in terms of finance, time and inconvenience.</p>	<p>Immediate</p> <p>1 week</p> <p>Weekly from Sept to March</p>
16. Despite several notices forbidding the consumption of food and drink, several trainees had bottles of drinking water on their work benches. This could lead to serious health risks to the trainee if the food becomes contaminated with hazardous substances. The water could also pose a problem if electrical equipment is nearby.	<p>Supervisors must enforce ban on food and drink in the workshops.</p> <p>Install a fresh drinking water facility in the trainee rest room with cups provided.</p>	<p>Immediate</p> <p>1 month</p>
17. All fire extinguishers regularly serviced.	<p>Commendable and inspect regularly to maintain good practice.</p>	<p>Immediate</p>
18. Several cupboard doors under the benches throughout the building were left open leading to risk of minor injury – likely to cause knee or leg injury.	<p>Inform staff and trainees to keep all cupboards shut and post appropriate notice on notice board.</p> <p>Ensure that supervisors Monitor compliance.</p>	<p>Ongoing</p>



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GC3 – THE HEALTH AND SAFETY PRACTICAL APPLICATION

Candidate's observation sheet

Sheet number 4 of 5

Student name: J. Brown

Student number: **C 9887**

Place inspected: S & J Joinery Training Workshops

Date of inspection: **27/January/2015**

Observations	Control measures	Timescale
Hazards and consequences	Immediate and longer-term actions	
BENCH WORKSHOP		
19. There was an unmarked glass bottle containing a liquid (solvent?) on one of the benches. This could be a substance hazardous to health that could cause injury and/or health problems. (COSHH)	Identify, label the bottle and place it in a secure store. If it cannot be identified then dispose of it safely. If it is identified, ensure that a risk assessment has been completed. Supervisor must inform trainees of the unsafe practice of leaving unmarked bottles on benches. Ensure that the use of hazardous substances is covered during induction training.	Immediate Immediate Immediate Each induction
20. Frayed lead to hand-held sander – risk of electric shock to the user or anyone who touches it.	Remove it from use immediately. Replace lead, PAT test sander and place it on the PAT register. Include in regular future PAT inspection schedule. Include electrical hazards and precautions in induction training for trainees.	Immediate 1/2 weeks Every 3 months Each induction
21. Chisels and a Stanley knife left on benches – could lead to serious injuries (deep cuts) to hands/fingers if touched accidentally. (PUWER)	Remove from benches and place in tool rack. Check to ascertain whether Stanley knife necessary. If it is, use one with a retractable blade. Report finding to supervisors and inform trainees of dangers. Monitor.	Immediate Immediate Ongoing



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GC3 - THE HEALTH AND SAFETY PRACTICAL APPLICATION

Candidate's observation sheet

Sheet number 5 of 5

Student name: J Brown

Student number: **C 9887**

Place inspected: S & J Joinery Training Workshops

Date of inspection: **27/January/2015**

Observations	Control measures	Timescale
Hazards and consequences	Immediate and longer-term actions	
MACHINE WORKSHOP		
22. Jig saw unguarded – guard has been removed. This is very serious and could lead to a serious hand injury particularly to inexperienced trainees. (PUWER)	Prohibit use of machine until guard installed. Supervisors to monitor future use of jig saw and encourage everybody to report any absence of guards in the future. Include need for correct guards on machines in trainee training sessions.	Immediate Immediate and on-going Each induction
23. Top guard on circular saw set too high – another serious problem with a significant risk of hand/arm injury to the operator, such as the amputation of a limb. (PUWER)	Prohibit use of machine until guard is correctly set. Inform supervisor of dangerous hazard. This indicates another serious weakness in the supervision process. An urgent meeting of all supervisors is required to discuss this and other problems. Set guard to correct gap. Ensure that inspection of all machine guards is part of maintenance schedule and monitor compliance.	Immediate Immediate Immediate Each week
24. Noise assessment has been done but several persons not wearing ear defenders even though noise levels are in excess of the upper exposure action level and mandatory signs are in place – indicates poor trainee supervision. High noise levels could lead to hearing damage.	Noise assessments are made every year and available in the machine shop. This is commendable. All persons in the machine shop must be trained to fit ear defenders properly and wear them when any machine is running. Include use of ear defenders in the trainee induction training.	Immediate Each induction
25. Only a water fire extinguisher available in the machine shop. All machines are electrically powered – could produce an electric shock if used on an electric motor.	Replace with 2 fire extinguishers – a carbon dioxide and a powder one. Investigate the reasons for this occurrence with the servicing contractor. Again review fire risk assessment.	Immediate 3 months 1 week
26. LEV not been inspected for 3 years. Possible reasons for dust	Arrange for an immediate inspection by a competent person to check the efficiency of LEV. Set up an ongoing contract for future inspections. Train staff and monitor compliance.	Immediate 3 months 3 months Immediate
27. Only a broom available for sweeping up excess wood dust. Inhalation hazard.	Remove the broom and replace with an industrial grade vacuum cleaner. Monitor that it is being used.	Immediate 3 months
28. Only trainees over the age of 18 years are allowed to use the machines and then only with close supervision.	This is very good practice and is commendable.	

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CHAPTER

19

International sources of information and guidance

- 19.1 Introduction 588
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- 19.3 Some useful websites 590
- 19.4 Health and safety forms 592

This chapter covers:

1. Guidance on searching the internet
2. Websites for principal sources of information and guidance on health and safety issues

It will also give you access to:

3. A range of forms for use in the management of health, safety and fire issues which are illustrated at the end of the chapter

19.1 Introduction

The authors and publishers are not responsible for the contents or reliability of the linked websites and do not necessarily endorse the views expressed within them. Listing should not be taken as endorsement of any kind. We cannot guarantee that these links will work all the time and we have no control over the availability of the linked pages. For this chapter of the book, as in Chapter 17, a less formal style has been chosen, speaking directly to you, the student.

Today using the internet for access to legislation, standards and guidance is universal and of great benefit to the international OH&S practitioner or person seeking information. Clearly there are many organisations who give small amounts of information free in order to gain your membership or custom. As internet users know, documents, guidance, reports, etc. can remain sitting on websites for years. So it is very important to ensure that they are up to date and authoritative. Guidance from good reliable sources is usually kept up to date and often states the date on which the site was last updated.

Fortunately in the OH&S field there are many organisations that freely allow the download of information because they are either governments, government funded or have a strong wish to make good guidance widely available. These include IOSH, RoSPA and many similar OSH organisations around the world; government departments in the USA, UK, Europe and beyond; universities and local authorities. In the UK, the HSE now allows free download of most of their extensive, authoritative and well-produced guidance. This is a significant change of policy in the last few years and provides a wealth of information for the OH&S practitioner and others.

Finding these sources of information and getting the best results from your searches can be a daunting task. The following general guidance may help when searching for occupational, safety, health, fire, chemical and environmental information on the internet. The websites are mainly in English but some are also in several other languages or a local language and English.

There is also a very useful free, UK Open University, 9-hour introductory course, Finding information in information technology and computing, LIB 5 at: <http://openlearn.open.ac.uk/course/view.php?id=2370>

19.2 How to search the internet effectively

19.2.1 The key to successful searching

Remember, you are smarter than a computer. Use your intelligence. Search engines are fast, but dumb.

A search engine's ability to understand what you want is very limited. It will obediently look for occurrences of your keywords all over the Web, but it doesn't understand what your keywords mean or why they're important to you. To a search engine, a keyword is just a string of characters. It doesn't know the difference between cancer the crab and cancer the disease ... and it doesn't care.

But **you** know what your query means (at least, we hope you do!). Therefore, you must supply the brains. The search engine will supply the raw computing power. While searching, bookmark any other sites of interest. Here are a few tips.

19.2.2 Use unique, specific terms

It is simply amazing how many web pages are returned when performing a search. You might guess that the terms "hard hat" are relatively specialised. A Google search of those terms returned 65,700,000 results! To reduce the number of pages returned, use *unique* terms that are *specific* to the subject you are researching. "Safety hard hat" reduces this to 93,000. Enter a short question, such as "what time is it?"

19.2.3 Use the minus sign (-) to narrow the search

How many times have you searched for a term and had the search engine return something totally unexpected? Terms with multiple meanings can return a lot of unwanted results. The rarely used but powerful minus sign, equivalent to a Boolean NOT, can remove many unwanted results. For example, when searching for the insect caterpillar, references to the company Caterpillar, Inc. will also be returned. Use Caterpillar -Inc to exclude references to the company or Caterpillar -Inc -Cat to further refine the search.

19.2.4 Use of + sign

Use a plus sign (+) prior to each word to view each word "separately" within your search results, such as *grammar+grammar+punctuation*.

19.2.5 Use quotation marks for exact phrases

Often remember parts of phrases I have seen on a web page or part of a quotation I want to track down. Using quotation marks around a phrase will return only those exact words in that order. It's one of the best ways to limit the pages returned. Example: "Safe as houses". Of course, you must have the phrase exactly right – and if your memory is as good as mine, that can be problematic.

19.2.6 Don't use common words and punctuation

Common terms like *a* and *the* are called stop words and are usually ignored. Punctuation is also typically ignored. But there are exceptions. Common words and punctuation marks *should* be used when searching for a specific phrase inside quotes. There are cases when common words like *the* are significant. For instance, *Raven* and *The Raven* return entirely different results.

19.2.7 Capitalisation

Most search engines do not distinguish between uppercase and lowercase, even within quotation marks. The following are all equivalent:

- ▶ technology
- ▶ Technology
- ▶ TECHNOLOGY
- ▶ "technology"
- ▶ "Technology"

19.2.8 Drop the suffixes

It's usually best to enter the base word so that you don't exclude relevant pages. For example, *bird* and not *birds*, *walk* and not *walked*. One exception is if you are looking for sites that focus on the act of walking, enter the whole term *walking*.

19.2.9 Maximise AutoComplete

Ordering search terms from general to specific in the search box will display helpful results in a drop-down list and is the most efficient way to use AutoComplete. Selecting the appropriate item as it appears will save time typing.

The standard Google start page will display a drop-down list of suggestions supplied by the Google search engine. This option can be a handy way to discover similar, related searches. For example, typing in *health and safety* will not only bring up the suggestion

health and safety at work but also *health and safety legislation* and *health and safety jobs*.

19.2.10 Specific file type search

In Google you can search by specific type of file by writing **filetype:<name_of_type>**, for example: "filetype:pdf" and write the subject that you are going to search then you will only get pdf files on that subject in the results.

19.2.11 Authors, institutions and other sources

Do you know the name of any author(s) working in this subject? By using the author's name, you may retrieve other references to similar work on the subject of your choice.

Is there an institution or competent authority(ies) known to have done some work in this area? Again try using the name; you may retrieve even more references.

Are any journals/indexing/abstracting service(s) specialising in the subject which are known to you? Again you can add these to your search.

Are there any information centre(s) specialising in the subject? This is similar to author searches because these information centres may well have produced a publication on the subject.

19.2.12 Don't forget the phone book

Telephone directories (white pages and yellow pages) are widely available now on the Web. This means that if you know someone's name and what town they live in, you can access their address, phone number, even their age. There are also databases ('reverse look-up') that allow you to type in a phone number and get the name and address of the person who owns the phone.

If you know the address of the person you are seeking, you can easily get a map of their town, street, and neighbourhood on the many web map sites. Some maps are precise enough to show the exact location of the person's home.

19.2.13 Privacy issues

The same things that you can find out about other people, other people can find out about you. Here's a list of some of the databases someone might access when researching you:

- ▶ Property sales and ownership;
- ▶ Land Registry;
- ▶ Postal service change-of-address records;
- ▶ Telephone books, past and present;
- ▶ Automobile registration records;
- ▶ Other vehicle registration, i.e. boats, private airplanes;
- ▶ Subscription lists for magazines and periodicals;

- ▶ National marketing databases;
- ▶ National email directories;
- ▶ Voter registration lists;
- ▶ Bankruptcy filings;
- ▶ Court proceedings/judgements;
- ▶ Professional licences;
- ▶ Tax records;
- ▶ Credit bureau records;
- ▶ Domain name registration records.

If you are concerned about your privacy, you can ask to have your personal information removed from web databases. It is difficult to remove all trace of yourself, though. Some events and transactions are legitimately matters of public record, and more of these public records are becoming available every year via the Web.

19.3 Some useful websites

1. **British Institute for Occupational Hygienists:** www.bohs.org/
 BIOH is the professional body for Occupational Hygienists in the UK and organises examinations and awards in Occupational Hygiene.
2. **CIS:** http://www.ilo.org/safework/cis/WCMS_CON_TXT_SAF_INF_STT_EN/lang-en/index.htm
 International Occupational Safety and Health Information Centres (CIS) and its National and Collaborating Centres which are located all over the world. The goal of this network is to help its members and the rest of the world to find information from the participating countries on subjects related to occupational safety and health (OSH). The CIS Centres Information Network can be accessed in three languages (English, French and Spanish).
3. **Department for Communities and Local Government (DCLG):** <https://www.gov.uk/government/collections/fire-safety-law-and-guidance-documents-for-business>
 DCLG has responsibility for Fire and has published a series of guides on the Regulatory Reform Fire Safety Order 2005 which can be downloaded free from their website.
4. **European Agency for Safety and Health at Work:** <http://osha.europa.eu/en>
 This Agency was set up by the European Union to promote the exchange of technical, scientific and economic information between member states. Has links to the European Commission legislation and also to each of the member states' legislation. Also contains links to Australia, Canada, Iceland, Switzerland, Norway, USA legislation. Note that the legislation appears in the language of that country.
5. **European Commission EUR-LEX portal:** <http://eur-lex.europa.eu/en/index.htm>
 Details of European legislation, publications including the Official Journal of the European Union which is updated daily, links to other Commission sites.
6. **FIRA International Ltd:** <http://www.fira.co.uk/>
 FIRA has driven the need for higher standards through testing, research and innovation for the furniture and allied industries. A non-government funded organisation, FIRA is supported by all sections of the industry through the Furniture Industry Research Association, ensuring ongoing research programmes which bring benefits to all. With unrivalled support from across the whole industry, FIRA also has the influence and capability to help shape legislation and regulations.
7. **Fire Protection Association:** www.thefpa.co.uk/
 The Fire Protection Association is the UK's national fire safety organisation. The association works to identify and draw attention to the dangers of fire and the necessary fire prevention measures.
8. **Glossary:** www.ilo.org/public/english/protection/safework/cis/products/safetytm/glossary.htm
 Glossary of Terms on Chemical Safety from the International Programme on Chemical Safety (IPCS) which is a joint venture between the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO) and the World Health Organisation (WHO). The language of chemical safety is drawn from many sources. These include medicine, toxicology, pharmacology, epidemiology, ecotoxicity and environmental pollution. Its terminology has developed in an unstructured manner with proliferation into multiple terms, some with overlapping, alternative or even ambiguous meanings. To facilitate international communication and comprehension this Glossary of Terms on Chemical Safety has been produced. It does not claim to be an exhaustive compilation nor a definitive list of approved terms, but because language and terminology are not static the compilers welcome suggestions for additions and improvements.
9. **Hazards Forum:** <http://hazardsforum.org.uk>
 The Hazards Forum was established in 1989 by the four major engineering institutions, the Institutions of Civil, Electrical, Mechanical and Chemical Engineers. The Forum was set up because of concern about several major disasters, both technological and natural. The Forum believes that there is widespread public misunderstanding of the nature of hazards and the risks they pose. The public reaction to the risks from genetically modified foods and those from smoking are two examples of differing attitudes. These attitudes may result from media attention; suspicion of assurances of safety bodies with a vested interest; or just ignorance. Whatever the reason the Forum believes there is a need to fill an educated but unbiased role and this the Forum aspires to do.

Health and Safety Executive (HSE): www.hse.gov.uk

The HSE is the Health and Safety Executive's main website containing general information on their areas of work and the latest news.

Health Development Agency (HDA): www.hda.gov.uk

The HDA is a special health authority that aims to improve the health of people in the UK – in particular to reduce inequalities in health between those who are well off and those on low incomes or reliant on state benefits.

Chartered Institute of Waste Management (CIWM): <http://www.ciwm.co.uk>

The CIWM is the professional body which represents over 4,000 waste management professionals – predominantly in the UK but also overseas. The CIWM sets the professional standards for individuals working in the waste management industry and has various grades of membership.

13. Institution of Occupational Safety and Health (IOSH): <http://www.iosh.org.uk>

IOSH is the chartered organisation representing occupational safety and health practitioners predominantly in the UK but elsewhere also. IOSH has a valuable website with technical services for members, training courses and many local branch meetings for practitioners.

14. IOSH International Links <http://www.iosh.org.uk>

IOSH has a comprehensive international site. International development is an integral part of IOSH's vision: 'a world of work which is safe, healthy and sustainable'. We need to improve safety and health at work not only within the UK, but also in developing and newly industrialised countries. The site gives access to linked sites like the ILO, WHO and local OSH organisations in many countries on all continents.

15. International Labour Organisation (ILO): <http://www.ilo.org/global/lang-en/index.htm>

The ILO is the global body responsible for drawing up and overseeing international labour standards. Working with its member states, the ILO seeks to ensure that labour standards are respected in practice as well as principle. The International Labour Organisation's site contains the Conventions and Recommendations which are continually being developed. Contains the full text of these documents.

ILO SafeWork Bookshelf http://www.ilo.org/safework_bookshelf/english?d&nd=170000102&nh=0

The SafeWork Bookshelf is a collection of key OSH documents produced, in whole or in part, by the ILO. It was compiled by CIS, the information arm of the SafeWork Programme of the ILO.

16. ISO (International Organisation for Standardisation): <http://www.iso.org/iso/home.htm>

ISO is the world's largest developer and publisher of International Standards.

ISO is a network of the national standards institutes of 162 countries, one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system.

17. Legislation – UK: <http://www.legislation.gov.uk>

This website is managed by The National Archives on behalf of HM Government. Publishing all UK legislation is a core part of the remit of Her Majesty's Stationery Office (HMSO), part of The National Archives, and the Office of the Queen's Printer for Scotland. These are freely available in full text. All acts from 1987 and Statutory Instruments from 1988 are available on the website. There are separate pages for Scottish, Northern Ireland and Welsh legislation.

18. Legislation – Other countries: www.gksoft.com/govt/en

Governments around the world on the Web. Lists government websites from over 220 countries. Classified under Worldwide Governments, European Governments, African Governments, American Governments, Asian Governments, Oceanian Governments. There are some multi-government institutions also listed.

19. National Examination Board in Occupational Safety and Health (NEBOSH): <http://www.nebosh.org.uk>

NEBOSH is the main accredited awarding body for Level 6 and Level 3 health and safety qualifications. Their awards are run by over 400 training organisations.

20. The National Safety Council USA: <http://www.nsc.org/Pages/Home.aspx>

The National Safety Council saves lives by preventing injuries and deaths at work, in homes and communities, and on the roads, through leadership, research, education and advocacy.

21. OSH World www.oshworld.com

List of organisations, governments, associations, trade and technical associations, trade unions listed under country and then alphabetically by name. Major organisations listed in each country including the ILO Health and Safety Information Centres.

22. OSH Links (formerly known as the Internet Directory) <http://www.ccohs.ca/oshlinks/about.html>

An extensive resource that can be used to find primarily Canadian websites that cover occupational health and safety subjects.

23. Royal Society for the Prevention of Accidents (RoSPA): <http://www.rospa.com/>

The Royal Society for the Prevention of Accidents is a registered charity established more than 90 years ago that aims to campaign for change, influence opinion, contribute to debate, educate and inform – for the good of all. By providing information, advice, resources and training, RoSPA is actively involved in the promotion of safety and the prevention of accidents in all areas of life – at work, in the home, on the roads, in schools, at leisure and on (or near) water. RoSPA's mission is to save lives and reduce injuries.

24. Safety, Health and Environment Intra Industry Benchmarking Association (SHEiIBA): www.sheiiba.com

The Safety, Health and Environmental Intra Industry Benchmarking Association offers web-based benchmarking tools designed for intra company knowledge sharing and performance.

25. Specifications and Standards

American National Standards Institute:

www.ansi.org

British Standards Institution:

www.bsi-global.com

European Committee for Standardisation:

www.cenorm.be

ILI – Informe London Information: www.ili.co.uk

International Standards Organisation:

www.iso.ch

26. WorkSafe Western Australia: <http://www.commerce.wa.gov.au/WorkSafe/>

WorkSafe is a division of the Department of Commerce, the Western Australian State Government agency responsible for the administration of the Occupational Safety and Health Act 1984. The principal objective of the Act is to promote and secure the safety and health of people in the workplace.

27. World Health Organisation (WHO): <http://www.who.int/about/en>

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.

19.4 Health and safety forms

All the forms illustrated are available on the companion website in Microsoft Word format for readers to download and use.

A.1 Management

M1 GENERAL HEALTH & SAFETY RISK ASSESSMENT EXAMPLE 1			No.
Firm/Company		Department	
Contact name		Nature of Business	
Telephone no.			
Principal Hazards			
1			
2			
3			
4			
5			
Persons at Risk			
Main Legal Requirements			
1			
2			
3			
4			
5			
Significant Risks		Consequences	
1			
2			
3			
4			
5			
Existing Control Measures			
1			
2			
3			
4			
5			
Residual risk, i.e. after controls are in place			
Severity		Likelihood	Residual Risk = SxL
Information - relevant HSE and trade publications			
Comments from Line Manager		Comments from Risk Assessor	
Signed		Date	
Signed		Date	
Review Date			

M3 CONTRACTORS' RISK ASSESSMENT EXAMPLE FOR CONFINED SPACES

INITIAL RISK ASSESSMENT DATE

Significant Hazards	Persons at Risk	Low	Medium	High	Residual risk
1 Poisoning from toxic gases	Employees			√	Low
2 Asphyxiation – lack of oxygen	Employees			√	Low
3 Explosion	Employees			√	Low
4 Fire	Employees			√	Low
5 Excessive heat	Employees		√		Medium
6 Drowning	Employees			√	Low
7					
8					

ACTION ALREADY TAKEN TO REDUCE THE RISKS

Compliance with:

HSE Guidance L101 - Entry into Confined Spaces
 Local Authority/client safety standards, e.g. on sewer entry.
 Entry into Confined Spaces Regulations 1997
 The Construction (Design and Management) Regulations 2015
 Dangerous Substances and Explosive Atmospheres Regulations 2002

Planning:

Eliminate need for entry or use of hazardous materials by selection of alternative methods of work or materials.
 Assessment of ventilation available and possible local exhaust ventilation requirements, potential presence of hazardous gases/ atmosphere, process by-products, need for improved hygiene/welfare facility.
 Prepare a method statement for the work.

Physical:

Documented entry system will apply, with a Permit to Work and method statement. Adequate ventilation will be present or arranged. Detection equipment will be present before entry to check on levels of oxygen and presence of toxic or explosive substances. The area will be tested before entry and continually during the presence of persons in the confined space. Breathing apparatus or airlines will be provided if local ventilation is not possible. Where no breathing apparatus is assessed as being required, emergency BA and rescue harnesses will be provided. Rescue equipment including lifting equipment, resuscitation facilities, safety lines and harnesses will be provided. A communication system with those in confined space will be established. Air will not be sweetened with pure oxygen. Precautions for safe use of any plant or heavier-than-air gases in the confined space must be established before entry. Necessary PPE and hygiene facilities will be provided for those entering sewers.

Managerial/Supervisory:

The management role is to decide on nature of the confined space and to put a safe system into operation, including checking the above and preparing a method statement. Flood potential and isolations must be checked.

Training:

Full training required for all entering and managing confined spaces. Rescue surface party to be trained, including first aid and operation of testing equipment. All operatives must be certified as trained and supervisory staff trained to the same standard. All persons entering a confined space should be physically fit.

Site Manager's Comments

RISK RE-ASSESSMENT DATE

M4 CONTRACTORS' RISK ASSESSMENT EXAMPLE FOR WORK ON FRAGILE ROOFS

INITIAL RISK ASSESSMENT

Significant Hazards	Persons at Risk	Low	Medium	High	Residual risk
1 Falls of persons through materials	Employees and Public below			√	Medium
2 Access across fragile material	Employees		√		Low
3					
4					
5					
6					

ACTION ALREADY TAKEN TO REDUCE THE RISKS

Compliance with:

Lifting Operations & Lifting Equipment Regulations 1998 (LOLER)
 Provision and Use of Work Equipment Regulations 1998 (PUWER)
 Work at Height Regulations 2005
 HSE Guidance HSC 150 – Health and Safety in Construction
 HSE Guidance HSG 33 – Safety in Roof work
 Construction (Design and Management) Regulations 2015

Planning:

Fragile materials will be identified before work begins. In each case, a risk assessment will be made to provide a safe system of work taking account of the work to be done, access/egress requirements and protection of the area beneath the work area. A method statement will be prepared.

Physical:

Suitable means of access will be provided, such as roof ladder, crawling boards, scaffolding or mobile elevating work platform. Handrails will be fitted. Where access is possible alongside fragile materials such as roof lights, covers will be provided or the fragile material will be fenced off. Soft landing airbags or catch nets will be provided as appropriate. Barriers and signs will be provided so as to isolate the area below fragile materials while work is in progress. No person is permitted to walk on suspected fragile materials for any purpose, including access and surveying.

Managerial/Supervisory:

The role of management is to prepare a method statement prior to commencement of the work, and to arrange for provision of suitable access equipment and trained personnel as required by the safe system devised. Managers must check risk assessments and method statements supplied by subcontractors and others, including the self-employed, to ensure that the proposed work method is safe.

Training:

All operatives must be given specific instructions on the system of work to be used in each case. Selection may be required of operatives who have experience of the work and are physically fit. MEWP operators must be fully trained with a suitable certificate of competence.

Site Manager's Comments

RISK RE-ASSESSMENT DATE

M6 WORKPLACE INSPECTION CHECKLIST

PREMISES

1	Work at Height	Ladders & Step ladders	Right equipment for the job? Level base? Correct angle? Secured at top and bottom? Equipment in good condition?
		Working platforms/ temporary scaffolds	Regularly inspected? Suitable for the task? Properly erected? Maintained and inspected?
		Use of mobile elevating work platforms (MEWPs)	Suitable for task? Operators properly trained? Properly maintained?
2	Access	Access ways	Adequate for people, machinery and work in progress? Unobstructed? Properly marked? Stairs in good condition? Handrails provided?
		Housekeeping	Tidy, clean, well organized? Even and in good condition?
3	Working Environment	Flooring	Non-slippery? Crowded?
		Comfort /health	Too hot/cold? Ventilation? Humidity? Dusty? Lighting? Slip risk controlled?
		Cleaning	Hygienic conditions? Normal conversation possible?
		Noise	Noise assessment needed/not needed? Noise areas designated? Tasks require uncomfortable postures or actions?
		Ergonomics	Frequent repetitive actions accompanying muscular strain? Workstation assessments needed/not needed?
		Visual display units	Chairs adjustable/comfortable/maintained properly? Cables properly controlled? Lighting OK? No glare? Washing and toilet facilities satisfactory?
		4	Welfare
Eating facilities	For pregnant or nursing mothers? Kept clean?		
Rest room	Suitably placed and provisioned?		
First aid	Appointed person? Trained first aider? Correct signs and notices? Eye wash bottles as necessary? Portable equipment tested?		
5	Services	Electrical equipment	Leads tidy not damaged? Fixed installation inspected? Equipment serviced annually?
		Gas	Hot and cold water provided?
		Water	Drinking water provided?
6	Fire Precautions	Fire extinguishers	In place? Full? Correct type? Maintenance contract?
		Fire instructions	Posted up? Not defaced or damaged?
		Fire alarms	Fitted and tested regularly?
		Means of escape/ Fire exits	Adequate for the numbers involved? Unobstructed? Easily Opened? Properly Signed?
		7	Work Equipment
Pressure systems	Safe working pressure marked? Properly maintained?		

M6 WORKPLACE INSPECTION CHECKLIST (Cont.)

PREMISES

7	Work Equipment (cont.)	Sharps	Safety knives used? Knives/needles/glass properly used/disposed of?
		Vibration	Any vibration problems with hand held machinery or with whole body from vehicle seats etc?
		Tools and equipment	Right tool for the job? In good condition?
8	Manual & Mechanical Handling	Manual handling	Moving excessive weight? Assessments carried out? Using correct technique? Could it be eliminated or reduced?
		Mechanical handling	Forklifts and other trucks properly maintained? Drivers authorized and properly trained? Passengers only where specifically intended with suitable seat?
9	Vehicles	On site	Speeding limits? Following correct route? Properly serviced? Drivers authorized?
		Road risks	Suitable vehicles used? No use of mobile phones when driving? Properly serviced? Schedules managed properly?
10	Dangerous substances	Flammable liquids and gases	Stored properly? Used properly/minimum quantities in workplace? Sources of ignition? Correct signs used?
11	Hazardous substances	Chemicals	COSHH assessments OK? Exposures adequately controlled? Data sheet information available? Spillage procedure available? Properly stored and separated as necessary?
		Exhaust ventilation	Properly disposed of? Suitable and sufficient? Properly maintained? Inspected regularly?

PROCEDURES

12	Risk assessments		Carried out? General and fire? Suitable and sufficient?
13	Safe systems of Work		Provided as necessary? Kept up to date? Followed?
14	Permits to work		Used for high risk maintenance? Procedure OK? Properly followed?
15	Personal Protective Equipment		Correct type? Worn correctly? Good condition?
16	Contractors		Is their competence checked thoroughly? Are there control rules and procedures? Are they followed?
17	Notices, Signs and Posters	Employers' liability insurance	Notice displayed? In date?
		Health and Safety law poster	Displayed? Latest design?
		Safety Signs	Correct type of sign used? Signs in place and maintained?

PEOPLE

18	Health surveillance		Specific surveillance required by law? Stress or fatigue?
19	People's behaviour		Are behaviour audits carried out? Is behaviour considered in the safety programme?
20	Training and supervision		Suitable and sufficient? Induction training? Refresher training?
21	Appropriate authorised person		Is there a system for authorising people for certain special tasks like permits to work, dangerous machinery, entry into confined spaces?
22	Violence		Any violence likely in workplace? Is it controlled? Are there policies in place?
23	Especially at risk categories	Young persons	Employed? Special risk assessments?
		New or expectant mothers	Employed? Special risk assessments?

M7 JOB SAFETY ANALYSIS

Job		Date	
-----	--	------	--

Department		Carried out by	
------------	--	----------------	--

Description of job

Legal requirements and guidance

Task steps	Hazards	Likelihood	Severity	Risk L x S	Controls

Safe systems of work

Job Instruction

Training requirements

Review Date

M8 ESSENTIAL ELEMENTS — PERMIT TO WORK

1. Permit Title		2. Permit No.	
3. Job Title			
4. Plant Identification			
5. Description of Work			
6. Hazard Identification			
7. Precautions Necessary		7. Signatures	
8. Protective Equipment			
9. Authorization			
10. Acceptance			
11. Extension/Shift Handover			
12. Hand back			
13. Cancellation			

NOTES REFER TO BOX NO ON FORM

- Should have any reference to other relevant permits or isolation certificates.
- Description of work to be done and its limitations.
- Hazard identification including residual hazards and hazards introduced by the work.
- Precautions necessary – person(s) who carry out precautions, e.g. isolations, should sign that precautions have been taken.
- Protective equipment needed for the task.
- Authorization signature confirming that isolations have been made and precautions taken, except where these can only be taken during the work. Date and time duration of permit.
- Acceptance signature confirming understanding of work to be done, hazards involved and precautions required. Also confirming permit information has been explained to all workers involved.
- Extension/Shift handover signature confirming checks have been made that plant remains safe to be worked on, and new acceptance/workers made fully aware of hazards/precautions. New time expiry given.
- Hand back signed by acceptor certifying work completed. Signed by issuer certifying work completed and plant ready for testing and re-commissioning.
- Cancellation certifying work tested and plant satisfactorily recommissioned.

Source HSE

M9 WITNESS STATEMENT FORM

Type of event		Date of occurrence	
Location of event			
Surname			
Forename(s)			
Address			
Telephone No.			
Employer			
Position (if applicable)			

Please provide an account of the event, as you saw or heard it arise, that may be of use in the incident/near miss investigation.

Lined area for providing an account of the event.

Signed		Date	
--------	--	------	--

M9 – Witness Statement

M10 ACCIDENT/INCIDENT REPORT

Name of Person		Date		Time	
Location			Place of Accident		
Department			Details of Injury		
Investigation carried out					
Duration		Date		Estimated absence	

Additional details of Accident (Diagrams, photographs and any witness statements should be attached where necessary)

Immediate Causes	Underlying or Root causes

Conclusions (How can this kind of incident/accident be prevented?)

Action to be taken		Completion Date	
--------------------	--	-----------------	--

Please ensure that an accident investigation and report is completed and forwarded to Personnel within 48 hours of the accident occurring. Some incidents e.g. involving death or major injuries or dangerous occurrences may have to be notified to the Enforcing Authority. (Mandatory in the UK)

Signature of Manager making Report		Date	
Copies to go to	Personnel Manager	Health & Safety Manager	Payroll Controller

INJURED PERSON

Surname			Forenames		
Home address					
Age		Male		Female	
				Occupation	
By ticking this box I give consent to my employer and Best Practice Co (if not employer) to disclose my personal information and details of the incident which appear on this form to safety representatives and representatives of employee safety for them to carry out the health and safety functions given to them by law. (May not apply outside Europe)					
Signature of injured person				Date	
Employee		Agency Temp		Contractor	
				Visitor	
				Youth Trainee	

KIND OF ACCIDENT Indicate what kind of accident led to injury or condition (tick one box)

Contact with moving machinery or material being machined	1	Injured whilst handling or lifting	5	Drowning or Asphyxiation	9	Contact with electricity or an electrical discharge	13
Struck by moving, including flying, or falling object	2	Slip, trip or fall on same level	6	Exposure to or contact with harmful substance	10	Injured by an animal	14
Struck by moving vehicle	3	Fall from height. Indicate approx. distance of fallmtrs	7	Exposure to fire	11	Violence	15
Struck against something fixed or stationary	4	Trapped by something collapsing or overturning	8	Exposure to an explosion	12	Other kind of accident	16

Detail any machinery, chemicals, tools etc. involved

--

Accident first reported to:

Position & Dept.		Name	
First Aid/medical attention by	First Aider Name		Dept.
	Doctor Name		Medical Centre
			Hospital

WITNESSES

Name	Position and Department	Statement obtained (attach all statements)	
		Yes	No
		Yes	No
		Yes	No
		Yes	No
		Yes	No
		Yes	No

For Office Use Only (if relevant)

Date reported to Enforcing Authority	by telephone		On form F2508		by email	
Date reported to Company Insurers		Were the recommendations effective?				

If No say what further action should be taken:

--



First Aid Treatment and Accident Record



Date: _____ FIRST AIDER AND/OR INJURED PERSON

No: _____

Part A: FIRST AID TREATMENT/EXAMINATION RECORD

1. About the person who was seen/treated

Name _____ Address _____ Postcode _____
 Occupation _____ Employer _____

2. About you, the person filling in this record

▼ If the incident did NOT happen to you fill in your name, address and occupation

Name _____ Address _____ Postcode _____
 Occupation _____

3. Treatment given (if any)

please provide details

Part B: INCIDENT AND INJURY DETAILS (if believed to be a work related incident complete the following)

4. Details of incident

▼ Say when it happened: Date ____ / ____ / ____ Time ____

▼ Say where it happened. State which room or area

▼ Say how the incident happened – give the cause if you can

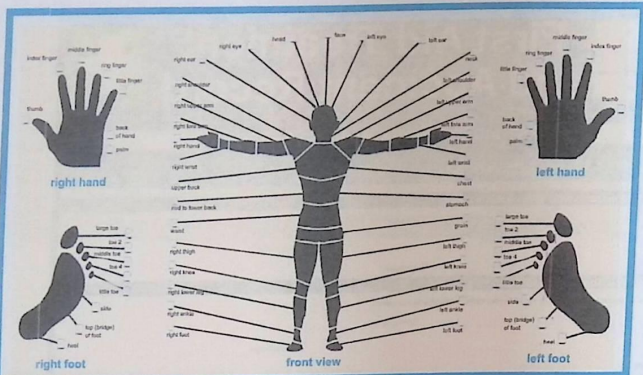
▼ If the person who had the incident suffered an injury, say what it was

▼ Please sign the record and date it

Signature _____ Date ____ / ____ / ____

5. Further details of injury (if any)

<input type="checkbox"/> Amputation	<input type="checkbox"/> Burn - Heat	<input type="checkbox"/> Electric shock	<input type="checkbox"/> Puncture
<input type="checkbox"/> Break/Fracture	<input type="checkbox"/> Concussion/headache	<input type="checkbox"/> Foreign body	<input type="checkbox"/> Scald
<input type="checkbox"/> Bruises (contusions)	<input type="checkbox"/> Crush	<input type="checkbox"/> Graze	<input type="checkbox"/> Splinters and blisters
<input type="checkbox"/> Burn - Chemical	<input type="checkbox"/> Cuts (laceration)	<input type="checkbox"/> Multiple Injury	<input type="checkbox"/> Sprain
			<input type="checkbox"/> Strain



6. For the Person Involved in the Incident Only

By ticking this box I give consent to my employer and Best Practice (if not employer) to disclose my personal information and details of the incident which appear on this form to safety representatives and representatives of employee safety for them to carry out health and safety functions given to them by law.

Signature _____

Date / /

FIRST AIDER PLEASE IMMEDIATELY INFORM RELEVANT TEAM LEADER/LINE MANAGER AFTER FIRST AID TREATMENT IS COMPLETED

name of person notified _____ date _____

7. BP Co Team Leader/Line manager Information - Please complete immediately and inform your line manager

Was a risk assessment carried out? YES/NO _____ If yes who did it? _____

If no, why not? _____

Was correct protective clothing worn? YES/NO _____

Why did the incident occur? What was its cause? _____

What action has been taken to prevent a recurrence? _____

Type of Incident: First Aid Injury *HSE Reportable - 7 days Other (give details)
 * must also notify Factory Manager/Health & Safety Manager immediately
 *Hospital Visit *HSE Specified Serious Injury
 *Lost time injury

Level of Investigation required (tick box) NONE MINIMAL LOW MEDIUM SERIOUS

Above must be completed within 24 hours of incident

8. BP Co Management Review - by Line Manager & Health and Safety Manager or Deputy

Comments _____

Name _____ Signed _____ Date _____

Type of Incident is correct Level of Investigation is correct

Name _____ Signed _____ Date _____

9. H&S Management System Entry - ONLY FOLLOWING COMPLETION OF 1-6 ABOVE


Entry by _____ Number _____

Action Allocated to _____ Date / /

19.4.2 Safety

S1 MACHINERY RISK ASSESSMENT

MACHINE NO	Model		Manufacturer		Risk Assessment No.:		
	Model no.		Other		Apprentice ID:		
HAZARDS	Hazard	Yes	No	Hazards:	Yes	No	
	Trapping/drawing in			Stored energy (vacuum/ tension)			
	Impact/crushing/mobility			Electrical radiation			
	Cutting/severing/sharp edges			Thermomechanical			
	Entanglement/ejection			Materials/ejection			
	Rough/slippery surface/falling			Environment/equipment			
WHO MIGHT BE HARMED?	Operatives		Cleaners	Maintenance	Visitor	Other	
GUARDING	Fixed Guards		Interlocked Movable Guards		Adjustable Guards	Permit Distance Guard	
	Adequate Enclosure of drives and motors		Fitted to machine		Fitted to machine		Fitted to machine
			Closed to run		Readily Adjustable		Securely Fixed
	Securely fixed in position		Design OK with positive switches and robust		Prevent Ejection		Prevents access to danger zone
	Tools required to remove		Safe to open		Maintained OK		Tool to remove
		Maintained OK				Maintained OK	
CONTROLS/ WARNINGS/ INSTRUCTIONS/ TRAINING	Controls			Instruction Training		Area	
	Clearly identified		Shrouded start		Warning signs	Lighting OK	
	Function Clear		Warning device		Signs clear	Stability OK	
	Easy to use		Isolator nearby		Safety sheet OK	Ventilation OK	
	Emergency stop		Isolator lockable		SOP available	LEV needed	
	Machine stops OK		Permit required		Training OK	Access operators	
	Safe at stop		Sealing needed			Access maintenance	
ACTION REQUIRED							
Severity		Frequency		Residual Risk (Dx2)			

ASSOCIATED PERMITS (specify type, if none state NA)		ON THE JOB COPY		GENERAL WORK PERMIT	Number GWP 0000000				
Type	Prefix & No.								
Type	Prefix & No.								
Type	Prefix & No.								
SECTION 1 ISSUE PLEASE PRINT DETAILS									
Permit Receiver/Competent Person in charge of work			Location of work/equipment to be worked on						
Name of person detailed to carry out work			Details of work to be done						
Risk Assessment attached? Yes <input type="checkbox"/> No <input type="checkbox"/> Reference			Safety method Statement or Safe System of Work attached? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Reference						
SECTION 2 ISOLATION of electrical or mechanical plant, liquid or gas pipeline or other energy source – give details									
Item		Lock location & reference		Isolated by: Print Name					
Attached Isolation sheet? Yes <input type="checkbox"/> No <input type="checkbox"/> Reference		Location of Keys							
SECTION 3 PREPARATIONS/PRECAUTIONS tick box									
	Yes	No	NA		Yes	No	NA		
1. Has every source of energy been isolated?				5. Are vessels/pipes free of toxic/flammable gas					
2. Have all isolations been tagged?				6. Any asbestos containing materials present?					
3. Have all isolations been tested?				7. Are the risk assessment control measures in place?					
4a. Does the standard of pipeline isolation meet minimum Corporate standards?				8. Other precautions/control measures required (specify)					
4b. If not, specify additional precautions									
SECTION 4 PERSONAL PROTECTIVE EQUIPMENT tick box									
Site Standard		Other specify							
Safety Goggles									
Hearing Protection									
Respiratory Protection		Specify Type							
SECTION 5 TIME LIMITS									
From	hrs	On	/	/	To	hrs	On	/	/
Max 24 hours		See overleaf for details of time extensions allowed							
SECTION 6 AUTHORISATION Permit Issue/Authorised Person				SECTION 7 RECEIPT Permit Receiver/Competent Person in charge					
I certify that it is safe to work in the area/on the equipment detailed in Section 1 above and that all safety measures detailed in Section 2-4 have been carried out/complied with ALL OTHER PARTS ARE DANGEROUS				I have read, understood and accept the requirements of this permit. I will ensure that everyone working under my supervision will strictly follow the requirements of this permit. I have checked the isolations.					
Print name		Date		Print Name		Date		Time	
SECTION 8 SUSPENSION OF GENERAL WORK PERMIT this is an exception and must be signed on the front of "on the job"									
I certify that the task for which this Permit was issued has now been suspended. We have agreed and implemented a procedure which complies with the criteria noted in the checklist in Section 13 overleaf									
Signed Permit receiver/Competent person in charge			Signed Authorised person						
Date		Time		Date		Time			
SECTION 9 CLEARANCE Permit Receiver/Competent Person in charge				SECTION 10 CANCELLATION Permit Issue/Authorised Person					
I certify that the work for which the permit was issued is now COMPLETED and that all persons at risk have been WITHDRAWN and WARNED that it is NO LONGER SAFE to work on the plant specified on this permit and that GEAR TOOLS and EQUIPMENT are all CLEAR				This permit to work is hereby CANCELLED, all plant is restored to safe operating conditions, including the replacement of guards.					
Print name		Date		Print name		Date		Time	
Signed				Signed					

PERMIT TIME EXTENSION/TRANSFER

Time Extensions

General Work Permits are normally only valid for a maximum of 24 hours.

When a permit is extended beyond 24 hours a Permit Issuer/Authorised Person must check ALL the conditions in the Permit. When satisfied there have been no changes and it is safe to continue the work specified in Section 1 Time Extension/Transfer Section 11 must be completed. The permit may be continued beyond a shift and be transferred to another Permit Receiver/Competent Person, who must check that all the precautions are in place and that they understand all of the requirements of the permit. Section 11 must be signed by the new Permit Receiver.

General Note

Except for Section 8 Suspension, the front sheet must not be altered or changed in any way. If there is a need to change the permit conditions (except Section 8 overleaf) then a new permit must be used. Extension sheet Mxxx must be used when Section 11 below is full.

SECTION 11 TIME EXTENSION/TRANSFER OPERATIONAL PERIODS

Permit is extended from	Print Name	Date as FRONT of Permit
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
Permit is extended from		Date
hrs to hrs	Authorised Person	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
Permit is extended from		Date
hrs to hrs	Authorised Person	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
Permit is extended from		Date
hrs to hrs	Authorised Person	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
Permit is extended from		Date
hrs to hrs	Authorised Person	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
Permit is extended from		Date
hrs to hrs	Authorised Person	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed
hrs to hrs	Permit receiver	Signed

SECTION 12 ADDITIONAL PEOPLE WORKING ON PLANT






SECTION 13 SUSPENSION OF GENERAL WORK PERMIT check list


Operation of machinery or plant with safeguards removed must be considered a measure of last resort and may only be carried out where it is not practicable to perform tasks, such as examinations or adjustments, in any other manner with the safeguards in place. Should it be necessary to re-examine part of the machinery to which this permit applies before the task is complete a Permit Issuer/Authorised Person must complete the following checklist and sign Section 8.

CHECK LIST	tick box			CHECK LIST	tick box		
	Yes	NA			Yes	NA	
Is number of people involved as small as possible?				Is area free of obstructions & slipping hazards?			
Have precautions been taken to keep people away?				Are all other parts suitably protected?			
Has loose clothing been avoided?				Are suitable precautions against hazards maintained?			
Is safe access with foothold & handhold provided?				Are people competent, briefed and supervised as necessary?			
Is there a means of stopping equipment?							Date
Check list completed by: print name				Signed			

52b - General work permit back of form

19.4.3 Health

		Site	Best Site	Work Area	Laboratory	COSHH Assessment No.	001												
Substance / Material: FORMALDEHYDE Task / Activity: Laboratory Work Hazardous Content: Formaldehyde* (40%), Methanol (10%) Health Hazard Groups: A / B / C / D / E		No of Personnel involved in Activity: One Person Frequency of Operation: Once per day Duration of Exposure: Up to ½ Hour Daily Quantity / Amount Exposed To: Use of small quantities under laboratory conditions. Specific Work Area: Inside well ventilated Area																	
Procedures Reference: Corporate Minimum Standard, H&SMan-002 Section 2 H&SMan-02 Section 3		Routes of Entry to Body:		INHALATION ✓	SKIN ✓														
Hazard Classification: 		Residual Risk: HIGH HAZARD LIQUID		(WEL) Workplace Exposure Limits Formaldehyde *2.5mg/m³TWA, 2.5mg/m³STEL WEL [15mins]															
Monitoring Arrangements If using engineering controls, ensure maintenance (Regulation 9.) 				Health Surveillance Requirements Material contains MEL and skin sensitising assigned substance, consider monitoring and skin checks (Regulation 10&11) 															
Hazards from Activity / Health Risks AVOID CONTACT WITH SKIN & EYES CAUSES BURNS TOXIC IF SWALLOWED, BY INHALATION AND IN CONTACT WITH SKIN LIMITED EVIDENCE OF A CARCINOGENIC EFFECT MAY CAUSE SENSITIZATION BY SKIN CONTACT RISK OF SERIOUS DAMAGE TO EYES Do not breathe in vapour When using do not eat, drink or smoke				Control Measures / Storage Personnel must wear lab coat or protective overalls when working with substance Chemical Resistant Gloves must be worn (Nitrile) Eye Protection to BS EN 166 Grade 3 Wear rubber boots General or local exhaust ventilation should be used to control airborne levels Store away from oxidising agents, stored at a temperature sufficiently high to avoid the formation of polymers															
First Aid INHALATION - REMOVE TO FRESH AIR AND REST IN THE EVENT OF SIGNIFICANT EXPOSURE CALL FOR MEDICAL ASSISTANCE IMMEDIATELY INGESTION - DO NOT INDUCE VOMITING INGESTION - GIVE PLENTY OF WATER IN SIPS INGESTION - GET IMMEDIATE MEDICAL ATTENTION EYE - IRRIGATE WITH WATER FOR AT LEAST 15 MINUTES EYE CONTACT - GET IMMEDIATE MEDICAL ATTENTION SKIN - REMOVE CLOTHING & WASH CONTAMINATED AREA WITH PLENTY OF WATER SKIN CONTACT - GET IMMEDIATE MEDICAL ATTENTION				PPE / Workplace Environment Control Measure Symbols 															
Spillage and Disposal VENTILATE AREA DO NOT ALLOW SPILLAGE TO ENTER MAINS DRAIN/SEWERS/WATER COURSES MARK THE AREA AND WARN ALL PERSONNEL WEAR NITRILE GLOVES WEAR EYE GOGGLES (GRADE 3) WEAR RPE WITH ORGANIC FILTER (A) WEAR PROTECTIVE OVERALLS & CHEMICAL/SAFETY FOOTWEAR ABSORB IN SAND OR INERT ABSORBENT MATERIAL COLLECT INTO A CONTAINER, CLOSE LID DISPOSE OF FOLLOWING SUITABLE SITE PROCEDURE OR SEEK L.A. GUIDANCE				Supplier: Chemical distribution Ltd Address: Bridge Way, Anytown Post Code: AN19 1SW Telephone: +44 (0) 1206 543210 Emergency Tel: 01234 567891 MSDS Reference: Link to Manufacturers Safety Data Sheet.															
Fire and Emergency ISOLATED SMALL SCALE FIRE: DRY POWDER - WATER SPRAY OR MIST - FOAM - CARBON DIOXIDE (CO ₂) LARGE FIRE. EVACUATE AREA. CALL FIRE BRIGADE OR FOLLOW SITE PROCEDURE WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TOXIC FUMES ARE PRODUCED WHEN SUBSTANCE IS INVOLVED IN A FIRE KEEP CONTAINERS COOL WITH WATER SPRAY				<table border="1"> <tr> <td>Assessor Name</td> <td>A.Another</td> </tr> <tr> <td>Date of Assessment</td> <td>10.01.11</td> </tr> <tr> <td>Approved By</td> <td>A.Another</td> </tr> <tr> <td>Date Re-Assessment Due</td> <td>10.01.13</td> </tr> <tr> <td>Assessment Printed Date</td> <td>10.01.12</td> </tr> <tr> <td>Assessment Revision No</td> <td>01</td> </tr> </table>				Assessor Name	A.Another	Date of Assessment	10.01.11	Approved By	A.Another	Date Re-Assessment Due	10.01.13	Assessment Printed Date	10.01.12	Assessment Revision No	01
Assessor Name	A.Another																		
Date of Assessment	10.01.11																		
Approved By	A.Another																		
Date Re-Assessment Due	10.01.13																		
Assessment Printed Date	10.01.12																		
Assessment Revision No	01																		

		Site		Work Area		COSHH Assessment No.	
Substance / Material: Task / Activity: Hazardous Content:				No of Personnel involved in Activity: Frequency of Operation: Duration of Exposure: Quantity / Amount Exposed To: Specific Work Area:			
Health Hazard Groups: A / B / C / D / E							
Procedures Reference:		Routes of Entry to Body:		INHALATION		SKIN	
				INGESTION		EYES	
Hazard Classification:		Residual Risk:		(WEL) Workplace Exposure Limits:			
Monitoring Arrangements:							
Hazards from Activity / Health Risks				Control Measures / Storage			
First Aid				PPE / Workplace Environment Control Measure Symbols			
Spillage and Disposal				Supplier: Address:			
				Post Code: Telephone: Emergency Tel: MSDS Reference: Link to Manufacturers Safety Data Sheet.			
Fire and Emergency				Assessor Name			
				Date of Assessment			
				Approved By			
				Date Re-Assessment Due			
				Assessment Printed Date			
				Assessment Revision No			

H1 - COSHH assessment record form

COSHH 1 – DETAILS OF SUBSTANCES USED OR STORED

Name of Manager:

Name of Department Area:

SUBSTANCE DETAILS

1. Information from the label

Trade name:

Manufacturer's name:

Name of many chemical constituents listed:

Hazard marking... corrosive irritant harmful toxic very toxic

Risk phrases or Hazard Statements noted on label (eg Harmful in contact with skin)

Safety phrases or Precautionary Statements noted on label (eg Avoid contact with skin)

PRECAUTIONS noted on label (eg Use in well ventilated area)

2. Have you got Safety Data Sheet or MSDS for this product

YES NO

DETAILS OF USE

3. What is it used for?

4. By whom?

5. How often?

6. Where?

7. What CONTROL measures (precautions) are used?

(e.g. local ventilation, goggles, respirator, protective gloves etc)

8. Is it ABSOLUTELY ESSENTIAL to keep/use this substance?

YES NO

9. Can it be DISPOSED OF NOW?

YES NO

COSHH 2 – ASSESSMENT OF A SUBSTANCE

1. Name of Substance:

2. Process or description of job where the substance is used:

3. Location of the process where the substance is used:

4. Health & Safety information on substance:

Hazards to health:

5. Precautions required:

6. Number of persons exposed:

7. Frequency and duration of exposure:

8. Control measures that are in use:

9. The assessment, an evaluation of the risks to health:

10. Details of steps to be taken to reduce the exposure:

11. Action to be taken (name):

Date:

12. Date of next assessment/review:

13. Name and position of person making this statement:

14. Date of assessment:

EXAMPLE OF A WORKSTATION SELF ASSESSMENT CHECKLIST

Name	Department	Date
------	------------	------

The completion of this checklist will enable you to carry out a self-assessment of your own workstation. Your views are essential in order to enable us to achieve our objective of ensuring your comfort and safety at work. Please circle the answer that best describes your opinion, for each of the questions listed.

The form should be returned to as soon as it has been completed.

ENVIRONMENT**1. Lighting**

Describe the lighting at your workstation.	About right	Too bright	Too dark	
Do you get distracting reflections on your screen?	Never	Sometimes	Constantly	
What control do you have over local lighting?	Full control	Some control	No control	

2. Temperature and Humidity

At your workstation, is it usually:	Comfortable	Too warm	Too cold	
Is the air around your workstation:	Comfortable	Too dry		

3. Noise

Are you distracted by noise from work equipment?	Never	Occasionally	Constantly	
--	-------	--------------	------------	--

4. Space

Describe the amount of space around your workstation.	Adequate	Inadequate	
---	----------	------------	--

FURNITURE**5. Chair**

Can you adjust the height of the seat?	Yes	No	
Can you adjust the height and angle of the backrest? Is the chair stable?	Yes	No	
Is the chair stable?	Yes	No	
Does it allow movement?	Yes	No	
Is the chair in a good state of repair?	Yes	No	
If your chair has arms, do they get in the way?	Yes	No	

6. Desk

Is the desk surface large enough to allow you to place all your equipment where you want it?	Yes	No	
Is the height of the desk suitable?	Yes	Too high	Too low
Does the desk have a matt surface (non-reflectant)?	Yes	No	

7. Footrest

If you cannot place your feet flat on the floor whilst keying, has a footrest been supplied?	Yes	No	
--	-----	----	--

EXAMPLE OF A WORKSTATION SELF ASSESSMENT CHECKLIST (cont.)

Document Holder

It would be of benefit to use a document holder, has one been supplied?	Yes		No	
If you have a document holder, is it adjustable to suit your needs?	Yes		No	

DISPLAY SCREEN EQUIPMENT

9. Display Screen

Can you easily adjust the brightness and the contrast between the characters on screen and the background?	Yes		No	
Does the screen tilt and swivel freely?	Yes		No	
Is the screen image stable and free from flicker?	Yes		No	
Is the screen at a height, which is comfortable for you?	Yes		No	

10. Keyboard

Is the keyboard separate from the screen?	Yes		No	
Can you raise and lower the keyboard height?	Yes		No	
Can you easily see the symbols on the keys?	Yes		No	
Is there enough space to rest your hands in front of the keyboard?	Yes		No	

11. Software

Do you understand how to use the software?	Yes		No	
--	-----	--	----	--

12. Training

Have you been trained in the use of your workstation?	Yes		No	
Have you been trained in the use of software?	Yes		No	
If you were to have a problem relating to display screen work, would you know the correct procedures to follow?	Yes		No	
Do you understand the arrangements for eye and eyesight tests?	Yes		No	

Any other comments

MANUAL HANDLING OF LOADS: ASSESSMENT CHECKLIST

Section A - Preliminary		Department:	Date:
TASK DESCRIPTION: Factors beyond the limits of the guidelines?		IS AN ASSESSMENT NEEDED? (ie is there a potential risk of injury, and are the factors beyond the limits of the guidelines?) YES/NO	
If 'YES' continue. If 'NO' the assessment need go no further.			
Tasks covered by this assessment (detailed description): Locations: People involved: Date of assessment:		Diagrams and other information:	
SECTION B - See separate sheet for detailed analysis			
SECTION C - Overall assessment of the risk of injury		Low <input type="checkbox"/>	Med <input type="checkbox"/> High <input type="checkbox"/>
SECTION D - Remedial action needed			
Remedial steps that should be taken, in priority order:			
a			
b			
c			
d			
e			
f			
g			
h			
Date by which action should be taken:			
Date for reassessment:			
Assessor's name:		Signature	

H5 - Manual handling of loads assessment record form

MANUAL HANDLING RISK ASSESSMENT: EMPLOYEE CHECKLIST

Task Description		Employee's ID no.			
RISK FACTORS					
A. Task Characteristics	Yes/No	Risk Level			Current Controls
1. Loads held away from trunk?		H	M	L	
2. Twisting?					
3. Stooping?					
4. Reaching upwards?					
5. Extensive vertical movements?					
6. Long carrying distances?					
7. Strenuous pushing or pulling?					
8. Unpredictable movements of loads?					
9. Repetitive handling operations?					
10. Insufficient periods of rest/recovery?					
11. High work rate imposed?					
B. Load characteristics					
1. Heavy?					
2. Bulky?					
3. Difficult to grasp?					
4. Unstable/unpredictable?					
5. Harmful (sharp/hot)?					
C. Work environment characteristics					
1. Postural constraints?					
2. Floor suitability?					
3. Even surface?					
4. Thermal/humidity suitability?					
5. Lighting suitability?					
D. Individual characteristics					
1. Unusual capability required?					
2. Hazard to those with health problems?					
3. Hazard to pregnant workers?					
4. Special information/training required?					
Any further action needed?					
Details:					

4.4 Fire

F1 FIRE SAFETY MAINTENANCE CHECKLIST

A fire safety maintenance checklist can be used as a means of supporting your fire safety policy. This example list is not intended to be comprehensive and should not be used as a substitute for carrying out a fire risk assessment. You can modify the example where necessary, to fit your premises and may need to incorporate the recommendations of manufacturers and installers of the fire safety equipment/

systems that you may have installed in your premises. Any ticks in the grey boxes should result in further investigation and appropriate action as necessary. In larger and more complex premises you may need to seek the assistance of a competent person to carry out some of the checks.

Source: Department for Communities and Local Government Fire Safety Guides

Fire Safety Maintenance Checklist	Yes	No	N/A	Comments
DAILY CHECKS (not normally recorded)				
<i>Escape routes</i>				
Can all fire exits be opened immediately and easily?				
Are fire doors clear of obstructions?				
Are escape routes clear?				
<i>Fire warning systems</i>				
Is the indicator panel showing 'normal'?				
Are whistles, gongs or air horns in place?				
<i>Escape lighting</i>				
Are luminaires and exit signs in good condition and undamaged?				
Is emergency lighting and sign lighting working correctly?				
<i>Fire-fighting equipment</i>				
Are all fire extinguishers in place?				
Are fire extinguishers clearly visible?				
Are vehicles blocking fire hydrants or access to them?				
WEEKLY CHECKS				
<i>Escape routes</i>				
Do all emergency fastening devices to fire exits (push bars and pads, etc.) work correctly?				
Are external routes clear and safe?				
<i>Fire warning systems</i>				
Does testing a manual call point send a signal to the indicator panel? (Disconnect the link to the receiving centre or tell them you are doing a test.)				
Did the alarm system work correctly when tested?				
Did staff and other people hear the fire alarm?				
Did any linked fire protection systems operate correctly? (e.g. magnetic door holder released, smoke curtains drop)				
Do all visual alarms and/or vibrating alarms and pagers (as applicable) work?				
Do voice alarm systems work correctly? Was the message understood?				
<i>Escape lighting</i>				
Are charging indicators (if fitted) visible?				
<i>Fire-fighting equipment</i>				
Is all equipment in good condition?				
Additional items from manufacturer's recommendations.				
MONTHLY CHECKS				
<i>Escape routes</i>				
Do all electronic release mechanisms on escape doors work correctly?				
Do they 'fail safe' in the open position?				

Fire Safety Maintenance Checklist	Yes	No	N/A	Comments
Do all automatic opening doors on escape routes 'fail safe' in the open position?				
Are fire door seals and self-closing devices in good condition?				
Do all roller shutters provided for fire compartmentation work correctly?				
Are external escape stairs safe?				
Do all internal self-closing fire doors work correctly?				
Escape lighting				
Do all luminaires and exit signs function correctly when tested?				
Have all emergency generators been tested? (Normally run for one hour.)				
Fire-fighting equipment				
Is the pressure in 'stored pressure' fire extinguishers correct?				
Additional items from manufacturer's recommendations.				
THREE-MONTHLY CHECKS				
General				
Are any emergency water tanks/ponds at their normal capacity?				
Are vehicles blocking fire hydrants or access to them?				
Additional items from manufacturer's recommendations.				
SIX-MONTHLY CHECKS				
General				
Has any fire-fighting or emergency evacuation lift been tested by a competent person?				
Has any sprinkler system been tested by a competent person?				
Have the release and closing mechanisms of any fire-resisting compartment doors and shutters been tested by a competent person?				
Fire warning system				
Has the system been checked by a competent person?				
Escape lighting				
Do all luminaires operate on test for one third of their rated value?				
Additional items from manufacturer's recommendations.				
ANNUAL CHECKS				
Escape routes				
Do all self-closing fire doors fit correctly?				
Is escape route compartmentation in good repair?				
Escape lighting				
Do all luminaires operate on test for their full rated duration?				
Has the system been checked by a competent person?				
Fire-fighting equipment				
Has all fire-fighting equipment been checked by a competent person?				
MISCELLANEOUS				
Has any dry/wet rising fire main been tested by a competent person?				
Has the smoke and heat ventilation system been tested by a competent person?				
Has external access for the fire service been checked for ongoing availability?				
Have any firefighters' switches been tested?				
Has the fire hydrant bypass flow valve control been tested by a competent person?				
Are any necessary fire engine direction signs in place?				

F2 FIRE RISK ASSESSMENT RECORD – SIGNIFICANT FINDINGS

Risk Assessment for		
Assessment undertaken by		
Company	Date	
Address	Completed by	
	Sign	
Sheet no.	Floor/Area	Use
Step 1 – Identify Fire Hazards		
Sources of ignition	Sources of fuel	Sources of oxygen
Step 2 – People at risk		
Step 3 – Evaluate, remove, reduce and protect from risk		
Evaluate the risk of the fire occurring		
Evaluate the risk to people from a fire starting in the premises		
Remove and reduce the hazards that may cause a fire		
Remove and reduce the risks to people from a fire		
Assessment review		
Assessment review date	Completed by	Sign
Review outcome (where substantial changes have occurred a new record sheet should be used)		

19.4.5 Construction

C1 CONSTRUCTION INSPECTION REPORT

1. Name and address of person for whom inspection was carried out.

--

2. Site address.

3. Date and time of inspection.

--	--

4. Location and description of place of work or work equipment inspected.

--

5. Matters which give rise to any health and safety risks.

--

6. Can work be carried out safely?

Yes

No

7. If not, name of person informed.

8. Details of any other action taken as a result of matters identified in 5 above.

--

9. Details of any further action considered necessary.

--

10. Name and position of person making the report.

11. Date and time report handed over.

12. Name and position of person receiving report.

--	--

19.4 Health and safety forms

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Workers stuck or crushed by moving vehicles on site	Workers could suffer serious or even fatal injuries from vehicles and machines on site – particularly when reversing	<ul style="list-style-type: none"> ■ Manager to agree safe route to work area with principal contractor based upon the construction phase health and safety plan. ■ Induction to each site to be carried out for all workers on first day. 	<ul style="list-style-type: none"> ■ Safe route agreed with principal contractor based. ■ Supervisor to liaise with site ■ Manager to ensure safe route stays clear. ■ Instruct staff that they must never drive vehicles and plant on this site. ■ High-visibility vests to be provided. ■ Supervisor to check vests are worn on all sites where the principal contractor requires them 	TB LG LG LG LG	20/3/06 from 1/5/06 from 1/5/06 from 1/5/06 from 1/5/06	20/3/06
Slips and trips	All workers may suffer sprains or fractures if they trip over waste including brick bands and pallet debris. Slips at height could result in a serious fall.	<ul style="list-style-type: none"> ■ Good housekeeping maintained at all times. ■ Waste including brick bands and pallet debris disposed of in skip. ■ Safety footwear provided to all workers ■ Safe route to workplace agreed with principal contractor based upon the construction phase health and safety plan. 	<ul style="list-style-type: none"> ■ Temporary storage locations to be agreed with site manager ■ Supervisor to ensure that workers wear safety footwear whenever on site 	TB LG	20/2/06 from 1/5/06	20/3/06
Stepping on nails and sharp objects	All workers could suffer foot injuries.	<ul style="list-style-type: none"> ■ Safety boots with steel toe caps and mid-soles provided to all workers. ■ Waste disposed of in skips. 	<ul style="list-style-type: none"> ■ Explain the need to wear safety boots and dispose of waste in skips – repeat annually. 	LG	1/5/06	1/5/06
			<ul style="list-style-type: none"> ■ Supervisor to check that safety boots are always worn and waste disposed of properly. 	LG	from 1/5/06	
Hazard to eyes, cutting bricks	Bricklayers could suffer eye injury through flying brick fragments	<ul style="list-style-type: none"> ■ Safety goggles (EN 166 B standard) worn when breaking bricks. 	<ul style="list-style-type: none"> ■ Use of goggles to be monitored by supervisor. 	LG	from 1/5/06	
Hazardous substances, mortar	Direct skin contact with the mortar could also cause bricklayer contact dermatitis and burns.	<ul style="list-style-type: none"> ■ Risk of dermatitis or cement burns and precautions explained to all workers. ■ Use cement or cement containing products within the use-by date. ■ Direct skin contact to be avoided, CE marked PVC gloves used when handling mortar. ■ Good washing facilities on site, with hot and cold water, soap and basins large enough to wash forearms ■ Principal contractor's first-aid includes emergency eyewash 	<ul style="list-style-type: none"> ■ Training on how to treat exposure to be given to all operatives. 	TB	17/4/06	26/4/06
			<ul style="list-style-type: none"> ■ Supervisor to be aware of anyone with early signs of dermatitis. 	LG	from 1/5/06	

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Dust from cutting bricks	Dust exposure could cause silicosis.	<ul style="list-style-type: none"> ■ Angle grinders replaced with block splitter, removing the risk of significant dust exposure. ■ The use of a grinder for chasing etc. is not needed on this job. 				
Operating cement mixer	Workers could be crushed or cut if the mixer topples or they get caught in moving parts. Damage to electrics could result in a shock.	<ul style="list-style-type: none"> ■ Cement mixer located on firm, level ground. ■ Mixer is fully guarded and guards in place during operation. ■ Mixer is 110 volt and PAT tested every three months. 	<ul style="list-style-type: none"> ■ Supervisor to check mixer daily for obvious damage. 	LG	from 1/5/06	
Noise from use of equipment, eg angle grinder	Workers using grinders or working near people who may suffer hearing loss.	<ul style="list-style-type: none"> ■ Angle grinders replaced with block splitter, removing high noise levels from our work. ■ Construction phase plan show other trades using grinders etc. should not be working close enough to cause problems. 	<ul style="list-style-type: none"> ■ Supervisor to monitor and talk to site manager if noisy work does start close by. 	LG	from 1/5/06	
Vibration from use of equipment such as angle grinder	Exposure to vibration can lead to the development of vibration white finger (VWF).	<ul style="list-style-type: none"> ■ Angle grinders replaced with block splitter. No significant vibration left. 				
Fire/explosion	All operatives in the vicinity could suffer from smoke inhalation or burns.	<ul style="list-style-type: none"> ■ Suitable fire extinguisher kept in site office and welfare block. ■ Good housekeeping monitored by supervisor. 	<ul style="list-style-type: none"> ■ Supervisor to brief all workers on first day on emergency arrangements agreed with principal contractor. 	LG	1/5/06	1/5/06
Welfare/first-aid	Good facilities help prevent dermatitis etc.	<ul style="list-style-type: none"> ■ Principal contractor will have facilities on site by the time bricklaying starts, including: <ul style="list-style-type: none"> ○ flushing toilet; ○ hot and cold running water, soap, towels and full-size washbasins; ○ heated canteen with kettle etc; ○ first-aid equipment; ○ principal contractor will arrange ○ clearing and ensure the necessary ○ electrical and heating safety checks are made; ○ and site agent is appointed person for first-aid. 	<ul style="list-style-type: none"> ■ Supervisor to brief workers on facilities and keeping them clean. 	LG	1/5/06	1/5/06

C2 - Risk assessment bricklayer example, page 3

C3 EXAMPLE RISK ASSESSMENT FOR WOODWORK

IMPORTANT REMINDER

Company name:
The Woodworking Company

Date of risk assessment:
28/09/07

This example risk assessment shows the kind of approach a small business might take. Use it as a guide to think through some of the hazards in your business and the steps you need to take to control the risks. Please note that it is not a generic risk assessment that you can just put your company name on and adopt wholesale without any thought. This would not satisfy the law – and would not be effective in protecting people. Every business is different – you need to think through the hazards and controls required in your business for yourself. Source HSE

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Exposure to wood dust	Staff risk lung diseases, such as asthma, from inhaling wood dust. Hardwood dust can cause cancer, particularly of the nose	<ul style="list-style-type: none"> ■ Local exhaust ventilation (LEV) provided at machines and staff are trained in using it properly. Bricklayers' supervisor to check with the site manager that the correct scaffold is provided and inspected. ■ LEV maintained to keep it in good condition and working effectively. LEV inspected every 14 months by a competent person. ■ Wood dust cleared up using a suitable vacuum cleaner, fitted with an appropriate filter. ■ Suitable respiratory protective equipment (RPE) as well as LEV for very dusty jobs, and staff trained in how to use it. ■ Staff do health surveillance questionnaire before starting, then annually. ■ Any affected staff referred to a medical professional. 	<ul style="list-style-type: none"> ■ Remind staff of the risks of wood dust, and why these controls are necessary. 	Manager	7/10/07	1/10/07
			<ul style="list-style-type: none"> ■ Remind staff never to dry sweep wood dust, which just spreads the dust around. 	Manager	7/10/07	1/10/07
Machinery	Staff risk serious and possibly fatal cut injuries following contact with moving parts of machinery, particularly saw blades	<ul style="list-style-type: none"> ■ All machines guarded according to manufacturers' instructions. ■ Guards inspected regularly and maintained as necessary to ensure their good condition. ■ Staff have sufficient space at machines to work safely. ■ Staff monitored by manager to ensure guards always used. ■ All staff trained in safe use of machines by a competent person. ■ All machines braked and fitted with necessary safety features, eg chip limited tooling etc. 	<ul style="list-style-type: none"> ■ Download information sheets on the safe use of the machines used in the workshop from HSE website and pin them up in mess room. 	Manager	4/10/07	1/1/07
Manual Handling	Staff may suffer musculoskeletal disorders, such as back pain, from handling heavy/bulky objects, eg timber boards and machinery parts. Also risk cuts when handling tooling, or splinters when handling pallets.	<ul style="list-style-type: none"> ■ Staff trained in manual handling. ■ Workbenches and machine tables set at a comfortable height. ■ Strong, thick gloves provided for handling tooling and pallets. ■ Panel trolley and lifting hooks available for moving boards. ■ Systems of work in place for the safe and careful handling of assembled furniture. 	<ul style="list-style-type: none"> ■ Where possible, store tooling next to the machine to reduce carrying distance. 	Manager	30/9/07	29/9/07
			<ul style="list-style-type: none"> ■ Remind staff to ask for a new set of gloves when old ones show wear and tear, and not to try to lift objects that appear too heavy. 	Manager	4/4/07	4/4/07

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Noise	Staff and others may suffer temporary or permanent hearing damage from exposure to noise from woodworking machinery	<ul style="list-style-type: none"> ■ Noise enclosures used where practicable, and maintained in good condition. ■ Low-noise tooling used where possible. ■ Planned maintenance programme for machinery and LEV systems. ■ Suitable hearing protectors provided for staff and staff trained how to use them. Check and maintain them according to advice given by supplier. ■ Staff trained in risks of noise exposure. ■ Staff trained in systems of work to reduce noise exposure (eg suitable feed rates for certain jobs, timber control etc). 	<ul style="list-style-type: none"> ■ Consider if certain machines could be safely mounted on anti-vibration mountings. ■ Include noise emission in specification for new vertical spindle moulder, to be purchased next year. 	Manager	30/9/07	29/9/07
				Manager	30/9/07	29/9/07
Vehicles	Staff may suffer serious, possibly fatal, injuries if struck by a vehicle such as a lift truck or a delivery lorry	<ul style="list-style-type: none"> ■ Fork-lift truck maintained and inspected as per lease contract. ■ Lift truck operated only by staff who have been trained to use it. ■ Pedestrian walkways marked. ■ Only authorised people allowed in yard for deliveries/dispatch. 	<ul style="list-style-type: none"> ■ Ensure drivers get out of their vehicle and stand in a safe area while it is being loaded/unloaded. 	Manager and all other staff	31/9/07	15/9/07
Slips, trips and falls	Staff could suffer injuries such as bruising or fractures if they trip over objects, or slip, eg on spillages, and fall.	<ul style="list-style-type: none"> ■ Generally good housekeeping – off-cuts cleared away promptly, dust cleared regularly etc. ■ Staff wear strong safety shoes that have a good grip. ■ Good lighting in all areas. 	<ul style="list-style-type: none"> ■ Remind staff to clear up spillages of wax or polish immediately, even very minor spillages. 	Manager	31/9/07	15/9/07
Electrical	Staff could get electrical shocks or burns from using faulty electrical equipment, eg machinery, or a faulty installation. Electrical faults can also lead to fires	<ul style="list-style-type: none"> ■ Residual current device (RCD) built into main switchboard. ■ Staff trained to spot and report any defective plugs, discoloured sockets or damaged cable/equipment to manager. ■ No personal electrical appliances, eg toasters or fans, allowed. 	<ul style="list-style-type: none"> ■ Ask landlord when the next safety check of the electrical installation will be done. ■ Confirm with landlord the system for making safe any damage to building installation electrics, eg broken light switches or sockets. 	Company secretary	31/9/07	15/9/07
				Company secretary	31/9/07	15/9/07
Work at height	Falls from any height can cause bruising and fractures	<ul style="list-style-type: none"> ■ Strong stepladder, in good condition, provided. ■ Only trained, authorised staff allowed to work at height. 	<ul style="list-style-type: none"> ■ Condition of stepladder to be checked periodically. 	Manager	31/9/07	as required
Fire	If trapped, staff could suffer fatal injuries from smoke inhalation/burns	<ul style="list-style-type: none"> ■ Fire risk assessment done, see www.communities.gov.uk/fire and necessary action taken. 	<ul style="list-style-type: none"> ■ Ensure the actions identified as necessary by the fire risk assessment are completed. 	Manager	from now	

C3 – Risk assessment woodwork example, page 2

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